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THE SEWERS OF PARIS.

THE VASTNESS AND PECULIARITIES OF THE SYSTEM.

The reader of *Les Miserables* will always carry in his mind a vivid picture of the sewers of Paris, in which one of the most marvellous of the many very remarkable events daguerreotyped in that wounderful book was enacted. Yet Victor Hugo gives, after all, only an outline of the vast arterial system, which so largely contributes to the sanitary eminence of the brilliant capital, treating its results chiefly in their economical bearings, and only incidentally touching upon the construction, peculiarities, and extent of the system itself. The details on these latter points, possessing an undoubted interest, at least to all dwellers in cities, are supplied in an elaborate and useful work recently issued from the French press; and from this we group some curious facts as to the vastness and peculiarities of the work.

The first vaulted sewer in Paris was constructed as early as 1374; but so slow was the progress of the improvement that the last uncovered sewer only disappeared ten years ago. The present system of sewerage was decreed on the 26th of March, 1852, and consists of six main galleries, called collectors; fifteen secondary ones opening into the former, and themselves fed by a vast number of smaller ones intersecting the city in every direction.

The smallest sewer is some seven feet in height by four in breadth, and the largest about thirteen feet in height and seventeen in breadth. The former is of an ovoid shape, and offords ample space for a man and a wheelbarrow. The largest sewer is divided into three parts, the two lateral ones forming foot pavements and the middle one a gutter or drain some four feet broad. On each foot pavement a series of iron posts support a water-pipe, varying in diameter from three and a half to two feet. In some of the galleries there is but one water-pipe. To cleanse the drain a small cart running on iron rails laid along the bottom is pushed forward by two men; the front of this cart is provided with a drop plank, acting like a sort of sluice, which, when down, exactly closes the section of the gutter, and pushes all the mud before it as the cart advances.

But the grandest feature of this sewerage system is a syphon by which the foul waters of a large part of the city are carried under the bed of the Seine to a proper outlet. This syphon is an enormous pipe of wrought iron, having an interior diameter of three and a third feet, and some seven hundred feet in length, which is sunk seven feet below the low-water mark. The general collector, into which all the secondary ones pour their floods, is a stupendous work, and probably without a parallel in the world. It is sixteen feet in height by eighteen in breadth, with a length of about eighteen thousand and forty-five feet in nearly a right line. The foot pavements in this immense subterranean avenue are some six feet, the central drain is nearly eleven feet in breadth, with a depth of five feet; so large, in fact, that a well-sized boat is kept afloat on it for the purpose of cleansing. Four boats in all are constantly employed in this work, and it takes 16 days to cleanse the whole length. Ventilation is provided for by air-traps at certain distances, and the gallery is lighted with oil-lamps.

The execution of this immense system of sewers has cost fifty million of francs ($10,000,000). The grand gallery is larger than the famous Cloaca Maxima of Rome, while the style of construction is of course vastly in advance of the Roman work. The Cloaca Maxima is over thirty feet in height, but is only thirteen feet broad, and is supposed never to have exceeded a length of three thousand feet.

TO BRITISH SUBSCRIBERS.

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They should then be enclosed to him, addressed to

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WHO MAKES THE BEST GAS-METER?

In our last number, we committed an unintentional error, by stating that the old firm of Harris & Brother of Philahelphia had become extinct We now correct the mistake, by stating that this well-known house still continue the manufacture of gas-meters, &c., at their old establishment, No. 1117 Cherry Street, Philadelphia.

NEW PATENT FOR PURIFYING GAS.

Mr. J. C. G. Howitz, the well-known gas-engineer of Copenhagen, Denmark, has taken out a patent in this country for purifying gas by means of iron-ore. The invention is based upon the following principles, which we find thus set forth in the columns of a contemporary:

The hydrated peroxide of iron decomposes the ammonia and sulphureted hydrogen contained in the gas, and forms sulphuret of iron, and therefore the gas is purified from sulphur just as well as by the use of lime. This method has the advantage that, as the peroxide of iron combines with sulphur, even when the gas is hot, it is not necessary to use a condenser, and if the purifiers are large enough, not even the scrubbing or cleaning with water is required, which is of great importance, as the gas will lose much of its illuminating power by a too-quick condensation and its coming in contact with water; the accumulation of napthaline is also diminished. The purifying material can be used over and over again, as long as there is anything left of it. When the material in a purifier is spent, it is placed in a receptacle with a water-tight bottom and washed out with the gas or ammonia water, which is poured over the material by a hose. After having passed through, the water is conducted to a water-tight tank. By this process the sulphur combines with the iron, and, when evaporated, sulphate of ammonia will remain. The following statement, obtained from the Copenhagen gas-works, will show the advantage of this invention. The coals used were New Pelton, Lesmahago cannel and Boghead cannel. One tun of coal gives 10,000 feet of gas; at the same time are obtained 16 lbs. of the sulphate of ammonia; quantity of gas manufactured last year, 160,000,000 cubic feet of gas, and at the same time 256,000 lbs. of sulphate of ammonia; this latter was sold at $6 per 100 lbs., or $15,360; the cost of producing this salt, not including the operatives in the purifying house, as they are also used in the ordinary purifying method—for two men, per day, $3 50; one stoker, per night, $2; coal for evaporating, $2 25; 120 lbs. of sulphuric acid, $1 25—total, $9. The quantity of sulphate of ammonia thereby produced was 500 lbs., at a cost per 100 lbs. of $1 80. This shows that while the present mode of purifying gas is expensive, by this improved process an actual profit arises. The expenses for altering gas-works to suit this new purifying method are very small on works where dry-lime purifiers are used, as these can be altered with a trifling outlay.

GAS COAL IN HOLLAND.

A correspondent of the London *Chemical News* writing from Rotterdam, Holland, gives some particulars concerning the existence of a vein of cannel coal in that country, which is of an excellent quality, and eminently adapted to the manufacture of either gas or coal oils. This coal deposit is situated "near the township of Gildenhuis, across the Dutch border, on Hanoverian territory," 4½ miles from the town of Oldenhaal. The writer says:

"It appears that while boring for sandstone was going on, now some six years ago, near Gildenhuis, a deposit of coal was found, which attracted much attention in a scientific, as well as in an industrial point of view, the more so, as the locality is not far distant from a district on Dutch territory, where coal, as a fuel for steam boilers, is in great request. The coal—a genuine cannel coal—is found about forty feet below the surface, in what, according to the best information I could obtain, is the *terrain nécomien*. * * * * This coal, besides having been used as fuel, was applied to gas-making, for which it seems eminently suited, as well as for obtaining oils—the so-called paraffin oils. The following parties have analyzed the coal, and some of them have also tested it for its gas-making and for its oil-yielding qualities: Professor Mulder, at Utrecht; the late Dr. Bleckrode, at Delft; Dr. Vohl, at Bonn; Dr. Werther, at Konisburg; Dr. Noellner, at Haarburg; Dr. Dumas, at Paris; and Dr. Hoffmann, at Lille. I quote here Mulder's analysis, which, as far as I have been enabled to see the results of the analysis of others, agree together. Specific gravity of the coal at 15° C., 1.11; water lost by careful treating, 1.30 per cent.; volatile at bright red heat, 55 per cent.; coke left, 45 per cent. Elementary composition in 100 parts dry sample; carbon, 84.10; hydrogen, 8.61; nitrogen, 1.08; oxygen, 5.46; ash, 0.75. On being treated with ether, this menstruum exhausted from the coal 1.08 per cent. of a resinous matter."

From the analysis, the composition of this coal far surpasses, both for gas-making and oil-yielding, nearly every other coal known, the writer claiming that it is even superior to the celebrated Boghead Cannel Coal. The deposit is said to be very large, and extensive preparations are being made to mine it.

NEW TEST OF THE VALUE OF GAS COAL.—A correspondent of the London *Chemical News* recommends trying upon gas coals the solvent power of ether, chloroform, and sulphide of carbon. He states that he has been busy trying British gas coals in this way, and that as the coals stand higher in value for gas-making purposes, as ascertained in daily practice by practical men, the larger is the proportion of matter in these coals soluble in the menstrua above named.

CARBURATION OF GAS IN LONDON.—The scheme of carburetting coal gas for the London street lamps, continues to meet with much opposition from many quarters, and we find in our English files numerous statements *pro* and *con* the measure. There seems to be no doubt but that the system entails much trouble and expense, but whether the advantages claimed for it by its advocates will prove sufficient to warrant its continuance is a question which time alone can solve.

WILLIAMSBURG, N. Y.—The price of the shares of this Gas-Light Company has been as low as *eleven per cent.* within the service of the present secretary, C. F. Blodgett, Esq. It is now 150 per cent.

WATER-WORKS OF AMERICA.

DETROIT, MICH.

The report of the Water-works of the city of Detroit, for the year ending Dec. 31, 1862, exhibits the condition of the same as being highly satisfactory.

The whole number of United States standard gallons of water, distributed during the year, was 994,945,329, being an increase over the quantity distributed the previous year of 99,815,906 gallons. The average daily distribution of water was 2,725,877 gallons. Estimating the population of the city at 60,000 would make the average daily distribution of water to each inhabitant forty-five gallons.

The following table shows the average daily running time of engines; the number of gallons of water delivered; the fuel consumed; cost of fuel; number of gallons of water delivered for each cord of wood consumed, and the number of gallons delivered for each one cent cost of fuel each year from 1853 to 1862 inclusive.

Year.	Average daily running time.		Number of Gallons of Water Pumped.	Cords of Wood Cons'd.	Cost of Wood Consumed.		Number of Gallons of Water delivered for one Cord of Wood consumed.	Number of Gallons delivered for one cent cost of fuel.
	Hou's	Min.			Dols.	Cts.		
1853	8	22	303,531,743	1122½	2,129	27	270,407	1425
1854	12	37	376,265,126	1331	2,271	34	282,693	1656
1855	10	58	542,807,364	1689	3,325	81	321,378	1632
1856	13	27	692,124,805	1889	4,017	44	366,396	1720
1857	14	28	697,090,523	1892	3,993	20	368,494	1745
1858	14	41	718,091,207	1815	3,665	20	390,133	1964
1859	15	30	782,112,587	1785	3,302	20	438,158	2368
1860	15	40	870,036,451	2267½	4,196	21	382,698	2070
1861	13	38	895,129,423	2450	4,879	07	365,399	2044
1862	14		994,945,329	1622	3,150	95	614,023	3157

Until the completion of the new reservoir in September, 1858, water was pumped into the Iron Tank, and the daily consumption of the city was equal to from three to six times the capacity of the tank; the engine was required to make five or six distinct runs each day, to keep up a supply, and during the intervals the fire was not allowed to go down; this mode of operating caused a large percentage of loss of fuel. From the 16th of October, 1860, to March 1st, 1861, there was also a large per centage of loss of fuel occasioned by using defective boilers. Engine No. 2, was non-condensing until June 1st, 1861, when it was altered to condensing, and the per centage of gain by this improvement is fairly shown by a comparison of the performance of the engine the past year with the performance in 1859, when both engines and boilers were in good condition, by which a gain of forty per cent. is shown.

While the water was pumped into the Iron Tank up to Sept., 1858, the average height it was delivered above the river was 70.5 feet, and since that time it has been pumped into the new reservoir 75.1 feet. The number of gallons of water pumped each month in 1861, and the corresponding months in 1862 and increase in 1862, are as follows:

MONTHS.	Number of Gallons of Water Pumped in 1862.	Number of Gallons of Water Pumped in 1861.	Monthly increase in 1862 Number of Gallons.
January....	79,195,725	76,071,428	3,124,297
February....	79,122,015	72,515,881	6,606,134
March.....	88,899,174	75,341,388	13,557,786
April.....	77,941,332	68,666,016	9,275,316
May.....	83,865,159	64,316,312*	19,548,847
June.....	81,936,414	68,956,018	12,980,396
July.....	83,761,398	78,510,978	5,250,420
August.....	87,221,610	81,388,881	5,832,729
September....	84,980,070	73,651,410	11,328,660
October.....	85,542,156	80,802,414	4,739,742
November....	79,751,952	77,927,157	1,824,795
December....	82,728,324	76,981,590	5,746,734
Totals....	994,945,329	895,129,423	99,815,906

The increase of water distributed the past year, is greater than for several years past; this excessive increase it is difficult to account for; the only probable cause must be a large increase of the quantity running to waste, for no corresponding use of water has occurred. The rain-fall the past year, however, was unusually small, to which fact may be attributed a portion of this increase. The total rain-fall in 1862, being only 35 inches and two-tenths, while the average annual fall for 23 years past is 43 inches, and during the four months from June to September inclusive, when water is mostly used for sprinkling streets, gardens, &c., the fall of rain in 1862, was only about one-half as great as it was in 1861, being in 1861, 18 inches, and in 1862 only 9 inches three-tenths.

* There was a short supply a part of this month while Engine No. 2 was being changed from non-condensing to condensing, and the water was pumped by the Dickerson & Sickles engine.

ENGINE-HOUSE.

During the past year several important changes have been made at the Pumping Works. Engine No. 1, which had been in use since 1840, was removed to give place to the new engine now being set up. The boilers were removed from the new boiler room, and the boiler, which occupied a place in the old engine house, was removed and set up there. The boiler, included in the contract for a new engine, was also placed in the new boiler room, and has been in use several months. The chimney stack which stood in the centre of the old engine house has been taken down. A small brick office has been built adjoining the engine-room for the use of the engineer. Coils of steam-pipe for heating, have been carried around the walls of the engine-room, and several other improvements of minor importance have been made.

Engine No. 2, condensing direct action; cylinder 29½ inches bore; stroke of piston, 8 feet; pump 18 inches bore, 8 feet stroke, has run 5,240 hours and 10 minutes, average daily run 14 hours and 21 minutes, making during the year, 5,264,261 revolutions. This engine being the only one, has been required to perform all the service of supplying the city with water during the past year, which it has done in the most satisfactory manner; having been in working order every day during the year, and no repairs whatever have been required to be made. The measured capacity of the pump is 105.75 U. S. gallons, and it delivers at each revolution of the engine, 189 gallons. During 1862 the engines were run 5,240 hours and 10 minutes, making 5,264,261 revolutions, delivering 994,945,329 gallons of water into the reservoir, consuming 1853 cords of mixed wood, at a cost of $3,150 95.

The wood the past season was purchased by running measure, averaging three feet and six inches in length, deducting one-eighth, will give 1,622 solid cords of wood consumed, and calculating by the actual cost of the wood consumed, the following aggregate result is shown.

Whole number of cords of wood consumed	1,622
Whole number of gallons of water delivered into reservoir	994,945,329
Number of gallons delivered for each cord of wood	614,023
Number of gallons delivered for each one cent cost of fuel	3,157

One cord of mixed wood is estimated equivalent to 960 pounds bituminous coal, which makes the wood consumed equivalent to 1,557,120 pounds of coal, and the number of gallons of water delivered for each pound of coal would be 645. Assuming the above estimate of the comparison of wood to coal to be correct, the value of coal as compared with the cost of the wood consumed, would be $4.05 per ton of 2,000 pounds.

The entire expenditure at the pumping works for labor, material, fuel, &c., the past year, was $6,332 82, and there was 1,571 gallons of water delivered for each one cent expended.

NEW ENGINE.

A considerable portion of the parts of the new pumping engine has been delivered and set up, and the contractors expect to complete and submit it for trial and acceptance in a short time. The appearance of this new structure, thus far is highly satisfactory, and the engineer has full confidence, that it will prove superior and more economical in its working than Engine No. 2.

The boiler for this engine is tubular, return flue variety; shell, 9 feet diameter, extreme length, 20 feet 3 inches; 2 main flues, 18 inches diameter, and 8 flues, 11½ inches diameter, 9 feet 6 inches in length; 112 tubes 3½ inches interior diameter, 15 feet in length. The boiler is walled in with brick, and covered with felt cloth.

The stone foundation to receive the engine is of the most substantial character, the stone-work is fourteen feet in depth below the bed plates; it is three feet wider at the bottom than at the top, laid with water lime cement, and well grouted throughout, the whole securely locked together with cross bars and holding-down bolts.

The engine is a horizontal condensing engine, 42 inches diameter of cylinder, 8 feet stroke, with steam-chests on the top of cylinder. The rock shafts are four in number, and are arranged on the steam-chests between the top of steam cylinder and the underside of steam and exhaust side pipes, from which are worked four lifting rods with lifters attached to the exhaust valves; on the top of each steam chest there are 3 columns 3½ inches diameter, and three feet long, which support a cap plate; on the front of this cap plate are the guide brasses, to guide the upper end of lifting rods; on the top of the plates the dash pots are bolted which serve to arrest the valves in their fall, and preserve the valve seats from damage; the trip motion is located in a groove cast in one of the columns on each steam-chest, which is adjusted by means a hand-wheel and screw. The main piston-rod is attached to a wrought-iron cross-head and connecting rod, supported on slides in the usual way; the main crank and shaft are of wrought iron; there are two pillow-blocks with brass linings; the caps of pillow-blocks are placed at an angle of 45 degrees, by means of which the lateral wear can be taken up without the use of the adjustable side brasses; the fly-wheel is 20 feet in diameter, is composed of one centre, 10 arms, and 10 segments, which form the rim; the rim is put together with 40 cold rivets, 1¼ inch in diameter, driven into the holes previously bored true, and 10 double dovetailed keys. On the end of main shaft opposite to main crank, there is a wrought-iron crank communicating motion through a connecting-rod and cross-head to the air-pump, which is a horizontal double-acting pump, cylinder of which is 17 inches bore, and 4 feet stroke. On the under side of air-pump, and extending its whole length, is a cast-iron channel-way, at each end of which are located the receiving or foot valves, which are of rubber, beating on cast-iron grates. In chambers cast on each end of, and at right angles to the bore of the pump, are located the discharge-valves, which are also of rubber; the condenser is placed between the discharge chambers on ends of air-pump, communicating with the channel-way underneath the air-pump, and connected with the steam-chests by means of a cast-iron pipe; on the top of air-pump the feed-pump is bolted, the supply-pipe to which is connected with the back discharge chamber on air-pump; the feed-pump receives its motion from an arm, keyed on the air-pump piston-rod.

The main water-pump from which the city is to receive its supply of water, is a horizontal double-acting pump, 24 inches bore, and 8 feet stroke, which receives its motion direct from the steam piston-rod, through a cross-head and slides; the pump piston-rod extends through the back pump cylinder-head, and is supported on a half cross-head and slide; on each end of main pump barrel is a pipe extending across the bed-plates, to which are attached two receiving and two discharge valve chambers; each chamber is provided with two circular valves, connected on one stem, having brass rings on their peripheries, and brass seats with rubber beats in the valve chambers; the dead weight of these valves is balanced by means of a small cylinder resting on three columns, on the cover of each valve chamber, and communicating by means of a pipe to discharge air-vessels from which a pressure is obtained, (and by means of mechanism, which would require drawings to be made intelligible,) the pressure is rendered constant, notwithstanding the fluctuating pressure in the rising main; on the receiving side of pump are two vacuum chambers; on the discharge side are two bell-mouthed pipes supported by four fluted columns; on the top of the bell-mouthed pipes, are two air-vessels, each 4 feet diameter, and 9 feet high. The engine and pump bed plates are of cast-iron, 16 inches wide, 4 inches thick, placed upon stone foundation, 70 feet long, 14 feet deep, averaging 7½ feet wide, with side foundation for air-pump and air-vessels. Bed plate bolts extend to bottom of stone foundation, and are 2½ inches diameter. The work thus far finished and erected are bed plates, the whole main pump, (except large air-vessels and receiving and discharge pipes,) steam-cylinder, steam-pump and air-pump slides, main pillow-blocks, main shafts, fly-wheel and eccentrics; the air-pump and condenser are nearly completed; the connecting rods, cross-heads

and shafts are ready to be placed in position; the pistons and rods are nearly finished, and the two large air-vessels will be cast in a few days.

The engine was designed by Mr. John E. Edwards, engineer of the Water Works, and constructed in Detroit by Jackson & Wiley, contractors, under the direction and supervision of Mr. William B. Robinson, engineer.

IRON PIPES.

The whole amount of iron pipes in use is as follows:

Interior Diameter.		Feet.
30 inches		327
24	"	14,435
20	"	507
18	"	60
16	"	1,525
12	"	528
10	"	17,013
8	"	14,743
6	"	24,115
4	"	117,537
3	"	16,157
2	"	308
Total		207,255—39 miles 1,335 ft.

WOODEN LOGS.

Iron pipe..... 829 feet.
Wooden pipe..... 11,038 feet.

Total..... 11,867 feet—2 miles 1,307 feet.

There have been 690 feet of wooden pipe disconnected, which had become defective; of these, 300 feet were laid by Jackson & Sutton, in 1841—and 390 feet by some of the superintendents between the years 1841 and 1852.

The whole amount of wooden logs now in use, is as follows:

	Feet.
Laid, 1840 and 1841	22,479
Laid, between the years 1841 and 1852	19,527
Laid by the Water Commissioners since 1857, 4 inches interior diameter	3,277
3 " " "	49,632
2½ " " "	56,741
Total	151,656—28 miles 3,816 ft.
Total pipeage—Iron pipe	39 miles 1,335 feet
Wooden pipe	28 miles 3,816 feet.
Total	67 miles 5,151 feet.

The theoretic head of water at the several localities named, and the time required at each locality to discharge 100 gallons of water through three different sized pipes, viz: one inch, 5-8 of an inch, and ¼ of an inch in diameter, are shown by the following tests which were made by attaching the pipes to fire plugs.

LOCALITIES.	Theoretic Head of Water.		Time with one inch pipe		Time with 5-8 inch Pipes.		Time with ¼ inch Pipe.	
	FEET.	TENTHS.	MINUTES.	SECONDS.	MINUTES.	SECONDS.	MINUTES.	SECONDS.
At the pumping works foot of Orleans street.	74	3	0	47	1	43	8	54
At the corner of Atwater and Rivard streets.	72	7	1	14	2	09	10	37
At the corner of Jefferson avenue and Russell street	49	9	1	24	2	25	12	43
At the corner of Jefferson avenue and Beaubien street	49	8	1	40	2	59	13	42
At the corner of Jefferson avenue and First street	67	5	1	16	2	22	12	26
At the corner of Woodward avenue and State street	49	7	1	35	3	04	14	54
At the corner of Woodward avenue and Sproat street	39	0	1	27	2	38	13	04
On Woodward avenue at B. G. Stimson's residence	36	0	1	32	2	51	14	20
At the corner of Michigan avenue and Griswold street	48	7	1	53	3	17	17	06
At the corner of Michigan avenue and Wayne street	51	0	1	45	3	09	16	00
At the corner of Michigan avenue and First street	53	1	1	45	3	09	16	00
At the corner of Fort and First streets	43	5	1	58	3	41	18	51
At the corner of Cinton and Rivard streets.	50	9	1	16	2	11	10	40
At the corner of Gratiot and Russell streets.	34	6	1	32	2	46	14	28
At the corner of Watson and Hastings streets.	33	1	1	19	2	32	14	04
At the corner of Grand River and Sixht streets	42	0	4	31	5	55	28	14

The test at the corner of First and Fort streets was made at noon, while the machinery in the manufacturing establishments in the vicinity was idle; a test made on the same day of the week while the machinery was in operation, required 26 minutes and 19 seconds time to discharge 100 gallons through a pipe ¼ inch in diameter.

A difficulty in the circulation of water in the distribution pipes in the vicinity of High and Winder Sts., was known to exist for several years past, and in making the foregoing tests, it was found that the hydrant there would discharge only about two-thirds the quantity of water in the same time, as the next one above, corner of Sproat street; when on examination it was found that the stop-cock on the line of pipe between them had become defective and closed itself. The stop-cock was at once removed and one of different pattern substituted.

It will be seen by the above tests, that the hydrant at the corner of Sproat street and Woodward avenue, discharged 100 gallons in about two-thirds the time the same quantity was discharged from the one at the corner of Fort and First streets, notwithstanding the theoretic head is three and a half feet greater at the latter point, showing the loss of head by friction and draught, the former one being located near the large supply main with few water takers in the vicinity, and the latter a mile from it, in a district consuming a large quantity of water, supplied by pipes of small diameter. Comparisons of other tests from hydrants in similar localities will show like results.

Much disappointment has been expressed by water takers requiring water at a high elevation, in not receiving it at the elevation anticipated on the completion of the new reservoir, and the failure is generally attributed to a want of sufficient elevation of the reservoir, whereas the real cause of failure is want of capacity in the distribution service, which should never be laid in populous districts with pipes less than six inches diameter, except where short lines are required, whereas, pipes of four inches in diameter have been assumed as the minimum, and since the introduction of steam fire-engines, experience has proven that a line of four inch pipe will not properly supply more than one engine.

The loss in the effective head of water in the central parts of the city for want of sufficient capacity in the distribution service is from twenty to twenty-five feet.

The pipeage in the city is about 68 miles, mostly embraced within an area of but little more than two square miles, forming perfect net-work through the streets and alleys within that space. A very large proportion of the pipes are of small calibre, to wit: about 22 miles are 4-inch, and 3 miles are 3-inch iron pipes, and about 28 miles are of wooden pipes, about one-half of which are 3 inches and the other half only 2¼ inches in diameter, which are mainly supplied through two lines of 10-inch mains about 3 miles in length, extending from east to west through the city, at a distance of nearly half a mile from each other. The intermediate space as well as the district on the outer side of either line, being supplied through distribution pipes 4 inches and less in diameter, supplying a daily consumption of nearly three millions gallons of water. The area of all the the sources of supply is not equal to the area of one pipe 18 inches diameter. The main outlet from the reservoir, which is 24 inches diameter, has been laid only to Woodward avenue, and is of but little avail yet is supplying the distribution pipes, being connected only with three 4-inch pipes leading down into the city, the entire area of which is less than 38 square inches, while the area of the main is 452 square inches, so that it will be seen that ample provision has been projected for furnishing an ample supply from the reservoir, and whenever other connections are made with the main, and as fast as they are made, the effective head of water will be increased, and by the extentson of a 10-inch pipe from it connected with the 10-inch pipe in Michigan avenue as contemplated, water consumers will realize the head of water they anticipated on the completion of the new reservoir. To accomplish this, will require an expenditure of about fifteen thousand dollars.

WOOD DISTRIBUTION PIPES.

Tamarack logs have been used for conveying water in Detroit for thirty-five years past, and when works were first constructed in 1827, no other kind of pipes were used. The pump main, from the river to the reservoir, corner of Jefferson avenue and Randolph street, was laid with logs of four and a half inches interior diameter, and the supply main in Jefferson avenue from Randolph to Cass street, was laid with logs three and a quarter inches bore, and logs of smaller calibre were laid for general service. Some of the latter remained in use until within a few years past, and were, when removed, found to be but partly decayed. When the works were purchased and reconstructed by the city in 1840, iron mains were used, but the pipes for general service were laid with Tamarack logs, nine miles of which were laid by the contractors for enlarging the works, about one-half of which are still in use. The others were mostly removed to give place to iron pipes of greater capacity, and but few were removed in consequence of being decayed. While, of the 18½ miles laid subsequently, from 1840 to 1851, about 15 miles have been removed in consequence of their actual and entire failure, and their failure is attributable to the want of care in the selection of the logs of proper quality and size, and laying them too near the surface of the ground, subject to the changes from wet to dry and from dry to wet, while the logs laid by the contractors were selected of good size, and laid at sufficient depth.

When the Works were placed under their present management in 1852, the Board, in consequence of the dilapidated condition they found the wooden pipes in, and the recommendation of their engineer, were induced to prohibit the further use of wood logs on the Works, and none were laid up to 1857: when, in consequence of the rapid growth of the city and expansion of the settled portions of its limits, a demand was created to supply nearly two thousand families residing in sparsely settled districts beyond the lines of water-pipes. The subject of supplying them appealed strongly to them as a sanitary question, but it was one of serious financial embarrassment. To supply them by means of even the minimum size (4-inch) iron pipe, they could not hope for remuneration from water-rates for many years to come, and they were induced to look for some cheaper mode of supplying them; when an investigation was made as to the cause of the early failure of the wood pipes formerly in use, which resulted in satisfying them that it was the result of bad work, that the *best* logs then in use were those that were *first* laid, about seventeen years before, and further, that the cost of wood pipes well laid would be only about one-fifth the cost of iron pipes, and at this reduced cost, lines of pipes could be laid into many districts that would pay a sufficient amount in water-rates to remunerate the works for the outlay, when the Board at once determined to return to the use of wooden pipes for conveying water to sparsely settled districts, and purchased a small steam-engine and Wyckoff's tubular boring machine for boring the logs. Since which time there has been laid nearly 29 miles of wooden logs, mostly in districts that could not otherwise have been supplied with water from the works with any prospect of remuneration to the works for many years to come.

It is evident that there cannot be any ultimate loss in laying wooden pipes where the annual water rates will, at the first, equal a reasonable interest upon the cost; for the increased uses of water along the line while they will last, could hardly fail to produce a total revenue that would be equal to the cost of the same and to supply the water consumed, both principal and interest, and if before their decay, the consumption of water should be greater than their capacity to supply, this very increase would insure the full payment of the cost of the logs, and would warrant the relaying of it with iron pipes.

The soil upon which the city is built, with little exception, is stiff and compact clay, and logs in such soil, if well laid, will last from 30 to 40 years; but in sandy soil their decay from the effects of continual changes between wet and dry, is quite rapid; therefore, when lines are extended through veins of sand, which are occasionally met with, care should be taken to lay the logs in a bed of clay, which is generally at hand on the line.

The logs now laid by the Board are of sound green Tamarack, not less than six inches in diameter at the small end, and eight feet in length; the joints are made with cast iron thimbles, and the lines are laid five feet below the surface of the ground.

WASTE OF WATER—WATER-METERS.

Water-takers have a direct interest in the prevention of the waste of water on their premises, for the rates have to be graduated to meet the expense of furnishing the requisite supply. It is estimated that the

quantity wasted, is fully equal to the quantity consumed, and the cost of pumping the water thus wasted has to be met by the rate-payers. Besides this, works of greater capacity are constructed than would other wise be required. If the works were not required to pump more water than was actually consumed, the expense of keeping up the supply would be materially lessened, and a corresponding decrease of the assessed rates would follow. The wanton waste of water cannot be effectually checked or avoided by the usual rules and regulations, and the exercise of the utmost vigilance by the officers and employees of the works. Therefore a strong appeal is made to the conscience and self-interest of water-takers, to render all the aid in their power to prevent any undue waste of water. Some manifest a strange indifference to a waste of water going on on their premises, regarding it as of trifling consequence, but if they will examine the table of the quantity of water discharged by different sized pipes, they will be able to form some estimate of the quantity wasted by defective fixtures. Fractures in service pipes frequently occur, through which more water will be discharged in twenty-four hours than would be required for actual consumption in many months, and yet no notice whatever is taken of it, so long as the needed supply can be procured, until compelled to by the supply being stopped altogether. Consumers should bear in mind that the rates paid by them, are based upon the quantity of water actually found necessary to be pumped, and this depends as much on the quantity wasted as the quantity used, so that every water-taker, while he pays for all he uses himself, in fact pays his proportion also of all his neighbor wastes. Every water-taker is directly and personally interested in every case of waste of which he has knowledge, for he is contributing to pay for it. A common practice has obtained, where fixtures are not protected from frost, of suffering water to run to waste continually during the cold weather; this practice during the cold weather last winter increased the quantity of water required to be pumped, about three hundred thousand gallons per day. This is an unnecessary waste that should not be tolerated, and public notice was given early last season, that those interested might secure their service fixtures from frost, that the practice would not be permitted in future, and wherever it occurs without express permission and payment therefor, the supply of water would be stopped.

The only corrective for all these abuses, is the introduction of water-meters, by which the quantity of water actually consumed could be ascertained, and it is believed that if water-takers would affix meters to their service connections it would result in a mutual benefit to themselves, and to the public interest, for they then would be required to pay only for the quantity of water actually consumed, and no more water would be allowed to pass through the meter than than that required for use. It is suggested that the rate, per barrel, be reduced to large consumers, when delivered through meters, as an inducement to procure them attached to their fixtures.

Rates are now assessed by estimate on all manufacturing establishments, hotels, livery stables, &c., and no just approximation can be made to the consumption and waste. Each case has its special controlling circumstances of use or wasteful neglect, and it is certain that the only equitable mode of ascertaining the quantity of water used and wasted in such places, and to determine the proper amount to charge therefor, would be by meter measure.

It is to be regretted that no meter has yet been produced that would admit of their general application to the service pipes supplying small consumers, for an inequality must necessarily exist as to the quantity of water used and wasted by different families where their assessed rates are the same, and whenever a correct and reliable meter, combining cheapness and durability, is produced, their general application to all supply pipes should be required, and the result would undoubtedly be to the mutual benefit of both the consumer and the works.

RAIN FALL AND HEIGHT OF WATER.

The depth of rain which fell at the city of Detroit during the year 1862, (snow reduced to water,) observations made by Mr. J. Berry, and the surface of the Detroit River, below the water-table of the engine-house, observations made by the engineer of the works, are as follows:

MONTHS.	FALL OF RAIN. INCHES.	TENTHS.	SURFACE OF RIVER BELOW WATER-TABLE. HIGHEST. FEET. INCH.	LOWEST. FEET. INCH.
January	3	1	4.1	5.7
February	2	2	4.5	6.1
March	5	6	3.9	5.9
April	2	3	3.1	3.11
May	2	8	3.5	3.9
June	1	3	3.5	3.9
July	2	5	3.5	3.9
August	3	3	3.5	4.0
September	2	2	3.9	4.1
October	3	2	3.11	4.7
November	3	5	4.3	4.7
December	3	2	4.5	4.10
Total	35	2		

The average annual rain-fall for the past twenty-three years is 3 feet 7 1-10 inches, or 82 feet 6 inches in all. The greatest quantity which fell in any one month during the twenty-three years was a fraction more than one foot and three inches, in July, 1855, and the least quantity in any month was a fraction more than the sixth of an inch, in February, 1841.

FINANCE.

The whole amount received during the past year is $67,908 72.

The amount received for water rates is $57,655 82, being an increase of $2,895 81.

The whole amount of expenditures of the Board, during the past year, was $76,663 79, of which $18,349 34 was for construction, including advance on new engine; $11,557 21 for expense and repairs; $44,936 25 for interest on the loans, and $1,820 99 for percentage and service cocks. Balance cash on hand, January 1, 1863, $34,347 44.

The receipts from ordinary resources and the current expenses show the following result for the past year:

Received from water rates		$57,655 82
Paid for interest, less amount received	$42,415 05	
Paid for current expenses, less cash credits properly belonging to same	10,389 02	
		52,804 07
Showing a surplus of		$4,851 75

after paying all operating expenses, and fully sustains the position assumed in former reports, to wit: that the rates established were sufficient to meet all expenses for maintenance and the interest on the loans, and provide from the annual surplus a sinking fund for the ultimate payment of the debt incurred for constructing the works. Relying for this upon the increased uses of water along the lines of pipe laid, and a reduction of the current expenses for maintenance, whenever the construction of the works was concluded, which expenses were necessarily greatly augmented while the work of construction was going on.

The whole amount of water delivered the past year, was 994,945,329 gallons, and the amount received for water rates was $57,655 82, or 5 79-100 cents for each 1,000 gallons. The net cost of delivering the water, including interest paid, was $52,804 07, or 5 31-100 cents for each 1,000 gallons delivered. Receipts over expenses 4 8-10 mills for each 1,000 gallons.

The whole cost of the main and distributing pipes laid by the Board is $384,893 14, and of the other branches of construction, reservoirs, engines, engine-house, fire-hydrants, etc., is $253,455 01; total, $638,348 15, less $17,064 58 credits to same, leaving the net cost $621,283 57; and the amount expended by the Common Council, for construction, before the works were placed under their present management, was $181,-015 93, making the total cost for construction, $802,-299 50.

The amount expended by the Board for construction since March 1, 1852, is		$621,283 57
The value of so much of the old works as is now in use, is		94,000 00
Present valuation of works		$715,283 57
To which add balance on hand		34,347 44
Value of the works, and cash on hand		$749,631 01
The total liabilities of the works		650,000 00
Value of the works over liabilities		$99,631 01

The whole amount of interest received for the money obtained by loans, during the period of its disbursements in the construction of the works, is $61,324 12.

The Board were authorized to issue bonds to the amount of seven hundred and fifty thousand dollars, and the whole amount issued is six hundred and fifty thousand dollars, which becomes due as follows:

On the 1st of August,	1873	$50,000 00
" "	1878	100,000 00
" "	1880	50,000 00
" "	1883	100,000 00
" "	1885	100,000 00
" "	1890	100,000 00
" "	1893	150,000 00
Total		$650,000 00

The following estimate of the receipts and expenditures for the ensuing year is respectfully submitted.

RESOURCES.

Cash on hand, Jan. 1, 1863	$34,347 44	
Receipts from water rates, etc.	60,000 00	
		$94,347 44

LIABILITIES.

For interest	$46,200 00	
For balance on contract for new engine	11,878 00	
For incidentals on new engine	1,000 00	
For wood pipe extensions	2,000 00	
For current expenses	11,000 00	
		$72,078 00
Balance, Jan. 1, 1864		$22,269 44

The following statement of the receipts and expenditures of the Board, from ordinary resources and ordinary current expenses, for the past ten years, and an estimate of the receipts and expenditures for the next ten years, was prepared and submitted to the committee on ways and means, at the commencement of the fiscal year.

STATEMENT OF RECEIPTS AND EXPENDITURES FOR THE PAST TEN YEARS.

YEARS	1852	1853	1854	1855	1856
INTEREST		74	8,696	27,932	35,120
CURRENT EXPENSES	7,453	12,398	11,747	17,122	16,980
ANNUAL LIABILITIES	7,453	12,472	20,443	45,054	52,050
ANNUAL RECEIPTS	15,893	25,605	38,313	38,456	41,743
	s $8,440	s 13,133	s 17,870	d 6,598	d 10,307

YEARS	1857	1858	1859	1860	1861
INTEREST	35,328	35,870	39,927	42,701	46,591
CURRENT EXPENSES	17,647	15,004	15,749	14,543	16,868
ANNUAL LIABILITIES	52,975	50,874	55,676	57,244	63,959
ANNUAL RECEIPTS	49,689	45,578	54,234	52,827	58,712
	d 3,286	d 5,296	d 1,441	d 4,417	d 4,237

s. Surplus. d. Deficient.

ESTIMATE OF RECEIPTS AND EXPENDITURES FOR THE NEXT TEN YEARS.

YEARS	1862	1863	1864	1865	1866
INTEREST	46,200	46,200	46,200	46,200	46,000
CURRENT EXPENSES	12,000	12,250	12,500	12,750	13,000
ANNUAL LIABILITIES	58,200	58,450	58,700	58,950	59,200
ANNUAL RECEIPTS	58,340	59,000	62,000	65,000	68,000
ANNUAL SURPLUS	$140	550	3,300	6,050	8,800

YEARS	1867	1868	1869	1870	1871
INTEREST	46,200	46,200	46,200	46,200	46,200
CURRENT EXPENSES	13,250	13,500	14,000	14,250	14,500
ANNUAL LIABILITIES	59,450	59,700	60,200	60,450	60,700
ANNUAL RECEIPTS	71,000	74,000	77,000	80,000	83,000
ANNUAL SURPLUS	11,550	14,300	16,800	19,550	22,300

The commission was organized in March, 1852. For several years previous, there had been great complaint of an insufficient supply of water, which resulted from an extension of the pipes beyond the capacity of the works to supply. The distributing pipes consisting of one mile, 1,573 feet of ten-inch iron main, through which the entire supply to the city was furnished: 1,450 feet of eight-inch pipe, 3,641 feet of six-inch pipe; 1 mile, 3,703 feet of 4-inch pipe, and 3,467 feet of 3-inch pipe, making in all 4 miles 3,274 feet of iron pipe. In addition to which there was about 32 miles of wooden pipe of small calibre, mostly two inches bore, making in all, about 37 miles of pipe. The greater part of the wood pipes had become defective in con-

sequence of the imperfect manner in whlch they were laid, and the Board were required to disconnect them and replace them with a proper system of iron mains and distribution pipes, and about twenty miles were relaid during the first six years, involving a large expenditure without a corresponding increase of revenue from rates.

To reconstruct, enlarge and extend the works, to provide for the future wants of our rapidly growing city, a large amount of money was required to be expended, and the Board have made loans as the money was required, amounting to $650,000; nearly two-thirds of the whole amount expended has been expended in main and distribution pipes, and the balance in providing adequate power to furnish the water, and storage capacity. Notwithstanding this large expenditure in so brief a period, involving the annual obligation for interest of about $48,000, the whole amount of the principal has been appropriated directly to construction, while the gradual and steady increase of revenue from water rates has been sufficient to meet the obligations for interest and the annual current expenses up to this time, and the net receipts the past year exceed the net expenditure interest and current expenses, four thousand eight hundred and fifty-one dollars and seventy-five cents.

The foregoing estimate of expenditures includes only the interest on the loans and the current expenses. The annual current expenses, it will be seen, are estimated below what they were for the past ten years; these expenses were necessarily greatly augmented while the work of construction was going on; that they were not under-estimated when this should be brought to a comparative close, is fully sustained by the result of the expenses of the past year, which are $2,706 54 below the estimate, and the net surplus receipts over liabilities is three thousand nine hundred and thirty-two dollars more than the estimate. The surplus at the end of the time estimated (1871) would amount to over $100,000, without calculating interest on the surplus from year to year. The first bonds falling due are payable in 1873, when $50,000 will be due; the next in 1878, when $100,000 are payable. These may be paid at maturity, when the amount of annual interest to be paid will be lessened, and it is not apprehended that there were will be any difficulty in providing payment for the balance, running through a period up to 1893.

The estimate of receipts is based upon the pipes as now laid, relying entirely on the increased uses of water from the lines now laid, of which there are more miles according to the population or cost of works, than any other water-works in the country.

The further extension of pipes would, of course, increase the receipts, without materially increasing the current expenses—and the power and capacity of storage are adequate to supply twice the present lines of pipes, but no provision is made for this in the foregoing estimate. The works having recently been constructed on a scale providing for the requirements of the next generation, it is deemed sufficient to impose on the present water-takers, to graduate the rates to them so as to meet the annual interest on their cost and the expenses of maintenance, and other provisions should be made for future extensions of pipes or additions to the works.

Distribution pipes will require to be extended from year to year to keep pace with the demand for water created by the steady expansion of the settled portions of the city limits; but this expenditure should not be made from the resources derived from water rates, *which should be strictly held to meet the interest on the loans and the expenses of maintaining the Works, in furnishing the supply of water and the incidental expenses thereto belonging*, and all surplus after this should be expressly appropriated to a sinking fund to provide for the extinguishment of the debt. The establishment of a *sinking fund* has been in contemplation by the Board from the commencement, and has never been lost sight of, but it has been delayed from year to year, until the construction account was closed, deeming it inconsistent while loans were required to be made, to do so. But now, when an estimate can definitely be made of the amount required to close this account, it is proper and expedient to make provision for such a fund.

During the past year permits were issued to 204 families to procure water free of charge, on the certificate of the director of the poor that they were unable to pay therefor, as follows, to wit: 25 for the period of one year, 153 for six months, and 26 for three months, amounting to $540.

MEMBERS OF THE BOARD OF WATER COMMISSIONERS OF DETROIT.

EDMUND A. BRUSH, WILLIAM R. NOYES,
ALEXANDER D. FRASER, JULIUS D. MORTON,
CHAUNCEY HURLBUT.

OFFICERS:

President,
EDMUND A. BRUSH.
Secretary,
ROBERT E. ROBERTS.
Superintendent of Extension and Repairs
BENJAMIN B. MOORE.
Engineer,
JOHN E. EDWARDS.
Reservoir Keeper,
JACOB L. MUTH.
Receiving Clerk,
GEORGE KUNZE.
Collectors,
JAMES FENTON, C. B. MOSHER.

SULPHUR IN GAS.

Some time since there was a great outcry respecting the gas supplied for public consumption. It was reported as deficient in illuminating power, and so imperfectly purified as to render its use, especially in small apartments, offensive, if not absolutely injurious. These reports were not wholly unfounded, but the grounds upon which they were urged were considerably exaggerated. It is perfectly true that the gas supplied in some districts did not give so powerful a light, neither was it so well purified as it is at the present time; but the fault lay with the consumers rather than with the gas companies, and was attributable chiefly to the old-fashioned laws of supply and demand. A gas-work, surrounded by a population willing to pay a good price, supplied, generally, a good article, whereas one in a poorer neighborhood sent out an inferior gas at a lower price, to suit its customers. But whether a high or a low price was charged, it was so proportioned to the quantity of the gas as to leave a profit to the shareholders in the gas companies; and, as every company was at liberty to fix both the quality and the price of the gas, there was great variety of price in different localities. The public, not understanding the difference in quality, could not understand the difference in price, and hence Parliament was appealed to, and an Act was passed, placing the claims, both of the gas companies and the consumers, upon a definite basis. The quality of the gas was never to fall below a given standard in illuminating power, and, within certain limits, the maximum price of the gas was fixed at 4s. 6d. per 1,000 feet: several restrictions were at the same time laid down, by which it was supposed the public would be still further protected, and the profits of the companies to some extent regulated. Since the passing of the Act, the gas has considerably improved, both in illuminating power and purity, and most of the companies supply a better gas than is required by the Act of Parliament. One condition, however, has arisen, which does not appear to have entered into the calculations of those who raised the agitation—the price of the gas has been increased, in many cases, 6d per 1,000 cubic feet. In the City of London great dissatisfaction was expressed at the rise in the price, and several indignation meetings were held to protest against it. Still, the proceedings of the gas companies were in conformity with the Act of Parliament, and the improved quality of the gas was promptly pointed out to the dissatisfied parties. That the gas possesses greater light-giving power, and that it is better purified, we readily admit; but we share the conviction of the public that the gas companies are benefitted to a far greater extent than the consumers by the Act of Parliament; gas is evidently profitable to its manufacturers, or the shares would not command such fabulous prices in the market.

The point to which we would direct attention on the present occasion has reference to the purification of gas, rather than its price, and, in order to obtain definite notions on the subject, it will be necessary to take a cursory view of the composition of coal; and to trace its components through the various processes to which it is subjected in the manufacture of gas for illuminating purposes. Coal, it has long been established, is the remains of vegetation which covered the earth in times far anterior to its adaptation to the life of man, the purest specimens being those which were formed by plants growing on the spot. The principal elements in common coal are carbon, hydrogen, oxygen and nitrogen, in addition to which sulphur and earthly impurities are always met with in small quantities. Of these substances, carbon and hydrogen form by far the largest proportion in the composition of coal, generally exceeding 90 per cent. of its whole bulk, and they alone are useful in the manufacture of gas; the other elements are useless or injurious, and the more perfectly the gas is purified from them the greater is its utility and desirability as an illuminating agent.

Several varieties of coal are used for gas illumination, the value of the coal for this purpose being determined by the relative quantity and quality of the volatile matters disengaged from it at a red heat. Thus, Boghead cannel produces 15,000 cubic feet of gas per ton of coal, very pure, and of great illuminating power, whereas Blenkinsopp coal produces less than 10,000 cubic feet of gas per ton, the illuminating power of which is considerably less than half of that produced from Boghead cannel coal. To obtain coal-gas, the coal is placed in retorts over furnaces maintained at a red heat. By this means, the volatile compounds are separated from the non-volatile, and an outlet-tube ascending from the retort conveys them into a larger tube, called the hydraulic main. Here the first step in the purification is accomplished. The end of the outlet-tube, which dips into the hydraulic main, is bent downwards, so as to dip to the extent of three or four inches in the water always contained in the hydraulic main. This simple mechanical contrivance is one of the most important agents in gas-making. By it the end of the tube is sealed, so as to prevent effectually the return of the gas during the charging of the retorts with the coal; and in the hydraulic main and in the "condensers," all the condensible products of the coal such as water, tar, ammonia, and other impurities, are retained. Thus separated from condensible vapors, the gas, still more or less impure from the presence of carbonic acid and sulphuretted hydrogen, is passed on to the purifiers. The purifiers are vessels charged with lime or oxide of iron, and with these substances the impurities of the gas combine, while the gas itself, having no tendency to form compounds with lime or oxide of iron, is unaffected, and passes on to gasometers, from whence it is distributed by large tubes.

Oxide of iron is now becoming the general agent for the purification of gas, on account of the property which it possesses of freeing itself, on exposure to the atmosphere, of the substances taken up from the gas: consequently, the same oxide of iron may be used an indefinite number of times for the same purpose. It must, notwithstanding, be confessed, that however economical to the gas companies, the process of "airing" the oxide of iron is by no means a pleasant one to the population in the vicinity of a gas-work; the stench evolved is almost unendurable; and brass fittings, silver watches, or a half-crown left in one's waistcoat pocket, become alike blackened by a deposit of sulphide. The purification of gas by lime involved perhaps even more unpleasantness. Lime can be used but once; hence arises a difficulty as to what shall be done with it after serving its purpose in a gas factory. Before the introduction of oxide of iron as a purifying agent, it was left to accumulate, under the title of "blue billy," to the infinite disgust of all who might have occasion to pass near it.

After all the processes of purification to which the gas is subjected, there still remains a small amount of impurity, the most obnoxious part of which is caused by the presence of a compound of sulphur, known to chemists as bisulphide of carbon. This substance, so far as our chemical knowledge extends at the present time, cannot be separated from the gas, as no agent is known which will absorb or decompose it on a large scale. Silversmiths are practically aware of the presence of a something in the gas which blackens their wares; hence the precaution usually observed by them

of lighting their shops, as far as possible, from the outside. But the public health was not so much endangered as many persons supposed, from the presence of a sulphur compound in the gas they were consuming. Experiments, conducted by practical chemists, have elucidated the fact, that the sulphur compounds exist in almost infinitesimal proportion in the gas now supplied for public use. We have before us the results of ten analyses of gas from different companies, in which it is stated that the sulphur present in gas as sulphide of carbon ranged from 2.99 grains to 9.41 grains in 100 cubic feet of gas: comparing by weight, 10,000 parts of gas contained respectively 1.2, 2.6, and 3.8 parts of sulphur: comparing by volume, 10,000 parts of gas contained respectively 0.236, 0.480, and 0.747 parts of bisulphide of carbon. Thus it will be seen that the amount of sulphur is so small that it is incapable of producing any injurious effects upon the human system.

One of the analysts, Mr. Versmann, a gentleman thoroughly acquainted with the chemistry of coal-gas, puts the case in a still clearer light. He took a number of common lucifer-matches, and by analysis found that many varieties of them have more than a grain of sulphur each. He then supposes that a large, lofty room is lighted with four gas-burners, each consuming 5 cubic feet of gas per hour, and that their flames burn for five hours in order to consume 100 cubic feet of gas, containing from 2.99 grains to 9.41 of sulphur. The same quantity of sulphur would be burned by lighting, during the five hours, from three to ten lucifers, and no one would entertain the least fear in so doing, although it is very possible that the phosphoric acid, simultaneously evolved, might be even greater in quantity than the sulphurous acid. Taking a particular case, it is remarked that four burners, each consuming 5 feet of gas per hour, will well light a room 16x16x20 feet, or containing 5,120 cubic feet. It will take five hours to consume 100 cubic feet of gas; and, supposing this to contain the maximum amount of sulphur allowed by the Metropolis Gas Act—viz., 20 grains—although this is more than double the quantity found by actual experiment—a volume of 0.032 cubic feet of sulphurous acid would be spread through the 5120 cubic feet of air during the five hours. If no ventilation whatever were allowed, the atmosphere of such a room would be in its worst condition at the end of five hours, "when it will contain 0.000625 per cent. of sulphurous acid; or 160,000 cubic feet of air will contain one cubic foot of sulphurous acid." These remarks—the result of careful analysis—will help to satisfy even the most nervous that there is no serious ground for alarm respecting the small amount of sulphur unavoidably present in gas; a much larger proportion must exist in it before any injurious effects will be experienced. This is not all: the gas examiners in most districts report that its purity, as well as its power, has increased during the last few months.

There is, however, a danger connected with the consumption of gas, the remedy for which rests in the hands of the consumers. A poisonous gas is generated, and in large quantities, by the burning of gas; but it is not susceptible by our nasal organ, and hence its presence is seldom challenged. The gas which we burn is not what chemists would call a regular compound—it is a mixture of gases, the most important of which, both in quantity and for light-giving purposes, are heavy and light carburetted hydrogen. These gases are composed of hydrogen and carbon; and, on combustion, the hydrogen unites with the oxygen of the atmosphere to form water, while the carbon combines with more oxygen to form carbonic acid gas. This latter substance is that from which danger to health is most likely to arise—partly from the large amount of it produced, and partly from the fact that its presence is in general unnoticed. For every 100 cubic feet of gas consumed, rather more than 50 cubic feet of carbonic acid gas are produced; in addition to which, it should be borne in mind, this quantity is augmented by every expiration of the breath of every individual present. When found in large quantity, as is sometimes the case in brewers' vats, the effects of this gas upon the human frame are instantly apparent; and many a poor fellow has lost his life for want of the usual precaution—that of letting down a lighted candle; but when the quantity in the atmosphere of a room is comparatively small, there is no monitor to mark its presence, although it may still be exercising a pernicious influence.

While, then, it would be desirable to remove all traces of sulphur from the gas consumed in our dwellings, we may rest satisfied that the quantity produced is not such as to cause any injury to our health. If we work in a small room, we require a small amount of gas—probably not so much as would produce in five hours sufficient sulphur for a couple of lucifers; whereas, in a larger room, with more burners, the sulphur evolved would be distributed over a larger space, and consequently its effects would be little felt. Carbonic acid cannot be got rid of in the combustion of gas; it is a product of all combustion, and the only way to counteract its effects is to supply a proper and sufficient ventilation to all rooms in which gas is consumed.—*London Social Science Review.*

PHOTOGENIC GAS—MONGRUEL'S NEW LIGHT.

A short time since, a series of reports, deeply tinged with *couleur de rose*, appeared in some of our daily contemporaries, on the advantages, economy, and convenience of a new light obtainable from ordinary gas, or atmospheric air, by means of Mongruel's Patent Generator.

Without drawing on these sources of information, or availing ourselves of the statements put forth in the prospectus, we will detail the result of our own examination of this invention.

On inspecting the apparatus, at 95 Bishopsgate-street Within, we found it to consist essentially of a cylindrical metallic vessel, about equal in size to the small gas-meter, which measured the gas passing through it. To the exit tube of this vessel, a series of gas jets were attached, consisting of argand, fish-tail, and bat's-wing burners. The gas obtained from the main was first burned as supplied, and secondly as passed through the generator, when an immediate and very strongly marked increase of light was observed; and moreover, the quantity of gas consumed at the same pressure was lessened about one-fourth, owing obviously to the resistance it experienced in passing through the generator. No definite information was given as to the liquid used, nor was the interior of the generator exhibited; but the following account appears in the prospectus:

"In M. Mongruel's generator, the mass of the liquid is enclosed hermetically in an upper chamber, whence it descends by a small tube, to form a thin sheet on the bottom of the lower chamber, wherein its vaporization is effected, and is supplied, drop by drop, only as what has preceded it is consumed. Without springs or mechanism, which may break or get out of order, it maintains a level physically and mathematically constant, and produces the vapors regularly, according to requirement. Further, the mass of the liquid held in reserve to feed the sheet which is vaporizing cannot become impoverished, as it is sheltered from all contact with the gaseous currents."

We need hardly tell our readers that there is nothing new whatever in increasing the illuminating power of coal-gas by saturating it with hydrocarbon vapors. The process was patented long ago by Mansfield, and has been practised by thousands since. We, ourselves, in a prior volume, suggested the employment of the lighter products of the mineral oils for this purpose; and, doubtless, many others had done so before. The pedestrians passing through the streets of London must have noticed in many of the lamps an ugly red canister, which contains naphtha for enriching the flame.

In fact, the idea is almost as old as the use of coal-gas itself; and the company may as well think of patenting the use of gas as the increase of its illuminating power by any volatile hydrocarbon vapors.

With regard to the combustion of atmospheric air, after passing it through the generator, we have no hesitation in characterizing it as one of the most absurd and impractical delusions of the day.

In the experiments shown, the air was forced from a gas-holder through the generator, and then burned in argand and bat's-wing burners, the fish-tail being out of repair. In the argands the combustion commenced with a smoky, dense flame, filling the entire glass; this, in a few moments, disappeared, and on carefully regulating the supply, an ordinary sized flame of very poor illuminating power resulted. The bat's-wing burner was even more unsatisfactory, no apparent ignition took place within half an inch from the burner, then appeared a band of pale blue, non-luminous flame, terminating above in an unsteady, feebly luminous yellow light. On being turned down so as to lessen the pressure, the flame smoked to a very great extent. On requesting to see the fish-tail in operation, we were informed the *jet was out of repair.* All the experiments with atmospheric air were most unsatisfactory, nor does it require more than the slightest smattering of chemical knowledge to prove that they must of necessity be so.

Atmospheric air consists of nitrogen and oxygen; the first is not inflammable, but dilutes the gas or vapor with which it is mixed, lessening its illuminating power. The second is much more injurious in an inflammable mixture, as under these circumstances it unites instantly with the carbon on the mixture being ignited, and thus prevents the separation of the latter in a solid form, which alone gives a luminous character to the flame.

The effect of mixing air with gas may be seen in the non-luminous flame of the gas-stoves that burn the mixed gases, or in the lights in the butchers' shops, when the wind is sufficiently powerful to mix with the issuing gas before its ignition; and were sufficient atmospheric oxygen forced through the generator, a pale blue, strongly heat-giving, but not luminous flame, would result. It is in fact only owing to their not being sufficient oxygen in the air employed, that there is any light emitted. The plan must be essentially a wasteful one, for the whole of the inflammable vapor which is oxidized by the air sent through, is absolutely burnt to waste; hence the pale color of the argand flame and the pale blue of the bat's-wing.

The report of the commission appointed by the "Société des Sciences Industrielles," on the generator Mongruel, is signed by several French celebrities of whom we have never previously heard, and is simply beneath notice. We are informed that the gas so carbonized consumes *less* oxygen, gives out *less* heat, and at the same time has both its ammoniacal and sulphurous vapors removed. The award of the society is so amusing, that we must quote it at length, even at the risk of exciting the envy of the self-appointed sanitary commissioners of the *Lancet.* The italics are our own:

"The Society decrees to the Generator Mongruel a Gold Medal, in consideration of its application to the photogenization of gas, and especially of atmospheric air, *as one of those brilliant inventions, in which the genius of man is revealed,* and which, making epochs in a century, are destined to favorably transform existing industries.

"The Members of the Commission: Le Docteur Marquis du Planet, Chevalier de la Legion d'Honneur; Le Docteur B. Lunel, Reporter; Charles Fournier, Engineer-Chemist; Lemaire, Architect; Gendre, Professor."

In conclusion, we can only recommend our readers who require to naphthalize their gas to have recourse to any of the cheap naphthalizers in common use. To use the lightest mineral turps for the purpose. To avoid all attempts at the introduction of atmospheric air. And, lastly, to lay out their money carefully in secure investments, offering a rational ground of success.—*London Ironmonger.*

CARBURATION OF GAS IN LONDON.—A new difficulty—says an English paper—has arisen in the application of the carburetting process. The naphtha now used is so rich a hydrocarbon that the lanterns are darkened with smoke, and an extra number of men is required to clean them. The matter was brought before the Commissioners of Sewers, of London, by the Great Central Gas Company, who sent specimens of the smoked lanterns for inspection; but Dr. Letheby, in the ardor of his advocacy, said, that the exclusion of light by smoke "was one of the most satisfactory evidences he ever had of the carburetting process;" and he inferred, from the obscurity of the light, that two feet of gas could be made to do the work of five. The Commissioners did not seem to be fully convinced by the learned doctor's logical inferences, and the letters from the Great Central Company were referred to the Gas Committee, to add to the perplexity in which they are already involved.

LEGAL LECORD.

SURETY ON GAS BILLS.

Supreme Court, General Term.—Before Justices Sutherland, Ingraham, and Clarke. The Manhatten Gas-Light Company, vs. Chas. Ely.

This was an action brought to recover the sum of $578 58 for gas supplied one H. S. Crocker, from the 20th January, 1860, to the 18th of February, 1860, and for rent of meter during that time.

The action was brought against the defendant as surety, upon the following contract:

"*To the Manhattan Gas-Light Company:*

The subscriber wishes to be supplied with gas-light and water in the premises No. — Gramercy Park street, occupied as the Gramercy Park House, and hereby agrees to pay for the same on the usual terms of the company. Succeeds Mr. Davis from this date.

"H. S. Crocker.

"Charles Ely, surety,

"New York, Feb. 18, 1856."

The case was referred, and the referee found that Crocker paid for all the gas consumed up to June, 1859, and that at that time he ceased to be the occupant of the house, being succeeded by one Charles W. Woodhull, who continued landlord and occupant up to February, 1860. Between Jan. 20 and Feb. 18, 1860, as appeared, the gas bills for the house were made out in Crocker's name, weekly, and presented for payment, the checks of Woodhull being taken in payment for all but one. Those checks were not paid, and the last bill presented was not paid in any form.

The answer set up the Statute of Frauds; and as a further defence, denied that the gas for which the action was brought was furnished to Crocker, for whom the defendant, by his written contract, became surety.

On the facts stated, the referee came to the conclusion that the defendant was not liable for the gas claimed in the complaint, assuming the legal validity of the defendant's agreement as set forth in the complaint.

The plaintiffs appealed, and the Court, per Sutherland, J., now rendered the following decision:

On the facts found, it is clear that the referee came to the correct conclusion. The first ground or reason stated by the referee for this conclusion was sufficient to authorize it.

By signing the written instrument set out in the complaint as security, the defendant undertook to pay for gas and meter supplied to Crocker at the Gramacy Park House, if Crocker did not pay. He did not undertake to pay for gas furnished to Woodhull, or to any other person than Crocker. The gas furnished for the Gramercy Park House during the time mentioned in the complaint was in fact furnished to Woodhull, as the landlord or proprietor of the house.

It is immaterial in this case, between the plaintiffs, and the surety, whether the plaintiffs had notice of the change in the proprietorship of the house or hotel, or whether, as between the plaintiffs and Crocker, on the facts found by the referee, Crocker would be liable, on the ground that he did not give notice to the plaintiffs of the change of proprietorship, inasmuch as by no reasonable construction of the defendant's undertaking as security could he be held responsible for any default of Crocker in not giving such notice.

The undertaking of the defendant as surety was to be responsible for any default of Crocker in not paying for the gas furnished him. He did not undertake to be responsible for any default of Crocker in not giving notice of any change of the proprietorship of the hotel.

The referee did not pass upon the question, whether the undertaking of the defendant was void by the Statute of Frauds. It is not necessary for us to pass upon it, or any other question in the case.

I think the judgment should be affirmed on the ground above stated.

Edward Fitch for appellant.

Luther L. Marsh for respondent.

Gas Explosion in England.—An explosion of gas recently took place at Leeds, England, in the dwelling-house of Mr. Wm. Hobson. Gas had been escaping all night from a leak in the pipes, and the next morning, when Mr. Hobson went down stairs very early, with a lighted candle in his hand, a violent exposion ensued, blowing out a window, doing other damage, besides burning Mr. Hobson about the face and hands.

PETROLEUM ITEMS.

The Pennsylvania Oil Market.—The Oil City *Register* thus speaks of the range of prices in that locality:

There has been but little change in the general range either in the prices or the amount of transactions for the past three weeks. On Tuesday last we had a fine river. The river commenced rising rapidly, and is now running nearly banks full, and rising slowly. It is too high for safe navigation. The oil fleet in the eddy is very large, and we should estimate the amount of oil loaded and ready for shipment, at about 50,000 barrels. Some estimates are still higher, but we think the figures stated will be about correct. The prices here have not changed materially. Producers are still holding out at $1.25 at the wells, and there have been large sales made at that price. We are advised of sales at this point at $1.60 to $2.00, barrels extra. We give as about the ruling rates, $1.00 to $1.25, at the wells. Buyers, on account of the freshet, are unwilling to give more than $1, while producers are firm at $1.25. The stability of the present prices here will depend to a great extent upon the amount of the present shipments that are thrown upon the market. A large quantity of it has been purchased to fill refiners' orders, and in the almost total absence of intelligence from the different markets owing to the failure of the mails to reach us, we can give no conclusive data for our dealers here to operate upon. The creek has been very high, and the oil is run out on the natural rise. The present fleet will take about all the stock now on hand, both on the creek and at this point, leaving nothing but the daily production to supply the market.—The market here closes quiet and firm. Barrels are scarce. Price of second-hand barrels, $2.00; prime new, $2.50. Holders are asking more, but there will be a large amount brought up this rise from below; sufficient, it is presumed, to fill the demand. Freights to Pittsburg, 75 cents. We have no wells to report, nor any particular change on the Creek. The weather is pleasant and cloudy.—The following steamers have arrived at this port since our last: Monitor, Tempest, Cottage, Le Claire, Dick Fulton, Grey Eagle, Monterey, Allegheny, Belle, Hunter.

Petroleum Barrels.—The *Register* says, that barrels are very scarce, and the price ranges from $2.00 to $2.50 each.

Another Flowing Well at Oil Creek, Penn.—On Wednesday last, a well was struck nearly opposite the Sherman well. Its capacity is variously estimated at from 250 to 500 barrels, and some estimate it as high as 1,000. As the well had not been tubed at our latest advices, of course no correct estimate can be formed. From the best information we can gather, it will not exceed 500 barrels. The well belongs to Dalzell & Ewing.—*Oil City Register.*

Oil of Asphaltum for the Preservation of Boilers.—M. Dollfus reports to the *Société Industrielle* of Mulhouse, his success in using the heavy oil extracted by M. Lebal from the asphaltum and bitumen, at Pechelbronn. He says that it is perfectly successful, and very economical as an unguent for heavy machinery. He applied it to the inner surface of his boilers and heaters, by warming them so as to make the oil more fluid, and then applying it in a thin coat by means of a common broom. The results were very satisfactory; the calcareous crusts were gradually detached, and the metal everywhere exposed.—"I continue to use the oil whenever I clean a boiler, and I judge that the expense, which is about 10 kilos. (20 lbs.) for a boiler of 45-horse power, is largely compensated for by the economy of fuel in consequence of the metal being clean; repairs are also much less frequent, as the boilers do not burn out so freely.—*Bulletin da la Société Industrielle de Mulhouse.*

Railway to the Canada Oil Springs.—The Bill to "enable the Great Western Railway Company to connect the Oil Springs in the Township of Enniskillen by branch railways, and to further amend their acts of incorporation," now before Parliament, passed its second reading on Monday the 9th inst. The second and third clauses in the bill read as follows, from which it is evident that if a branch should be constructed to the Sarnia branch, the point of intersection will be Wanstead.

"2 If the line to the Sarnia Branch of the Great Western Railway hereby authorized, shall terminate at Wanstead, and shall be so permanently and actually located by a resolution of the Board of Directors of the Great Western Railway Company, then from thenceforth the Act passed in the twenty-fourth year of Her Majesty's reign, entitled, 'An Act to incorporate the Petroleum Springs Road Company,' shall be repealed, and stand repealed; and all conveyances and agreements obtained by or in the name of the Petroleum Springs Road Company, for the acquisition of their right of way, of which the Great Western Railway Company shall desire to avail themselves, shall enure to the benefit of the Great Western Railway Company, and be read, construed, and have effect, as if made to or with them, and taken on their behalf, and as if this Act had been passed before the making of such conveyances and agreements respectively."

"3. And if the said line to the Sarnia Branch shall terminate at Wanstead, and be so located there as aforesaid, the portions of the two streets laid out in the plan and survey of the Village of Wanstead, known as Woodford and Essex streets, lying to the southward of the Northern line of the Sarnia Branch of the Great Western Railway, shall cease to be public highways; and the portions thereof lying within the lands of the Great Western Railway Company shall from thenceforth be vested in that Company in fee simple, freed from any public or private easement over the same; and also the right reserved by Henry C. R. Beecher, Esq., in and under an Indenture made on the twelfth day of February, one thousand eight hundred and fifty-nine, whereby certain lands were conveyed to the Great Western Railway Company to open at any future time another street or highway a cross the said Railway over the lands thereby conveyed, shall no longer exist, and the said Railway Company shall henceforth hold the same freed from any public or private easement over the same."

New Well in the Canada Region.—Frequent reports of new oil districts having been discovered in various localities around us have been the rounds of late, proving, however, till now, false.—But this time the fact is beyond a doubt, that another oil district has been developed within two miles of Bothwell station on the Great Western, about 17 miles south of this place, in an adjoining county, and a well which flows intermittently, and yield about 70 barrels per day, is now being worked there. The well was put down and is owned by Mr. Lick of Detroit, we believe. It is the third and only successful one of the three dug by that gentleman, and is 229 feet deep from the surface, and 44 feet in the rock. The sinking of wells at that place is said to be attended with much greater difficulty and expense than in Enniskillen, but if the yield is good, the extra expense will prove but a slight drawback to further developments there of an article of such high commercial value.—*Oil Springs Chronicle.*

The Canada Oil Market.—The *Chronicle* says:

Owing to the bad roads since the late rains, very little oil has been going forward, but at present there is prospect of improvement.—Prices remain the same, at $1 00 per barrel for crude, and 18 to 20 cents for refined. Spirits of petroleum in good demand at 25 cents. Much oil that is being manufactured here is shipped direct to Liverpool and London. The home market is well stocked for the present, with very little encouragement to refiners, yet all are industriously employed, in hopes that the market will soon revive. But the nature of circumstances is such, dullness may be expected for several months, after which activity will be sure to result.

Lowest and Highest Prices Paid for Crude Oil during each Month of 1852.—From the Philadelphia *Coal Oil Circular* we take the following:

	Philadelphia.	Pittsburgh.	Oil City.	New York.	Boston.
Jan...	15¼*a*22	10 *a*20	† 65*a*$1.25	16 *a*24	19 *a*26¼
Feb...	12 *a*16	8½*a*13	† 50*a* 95	13 *a*18	16½*a*18
Mch...	10 *a*14	4¾*a* 7¾	† 30*a* 75	12½*a*15	15 *a*18
April..	9 *a*11	4¾*a* 5	† 30*a* 75	8 *a*13	11 *a*16
May...	8¼*a*10¼	2¼*a* 4¾	† 38*a*$1.00	9 *a*12½	8½*a*13
June..	8½*a*10¾	3¾*a* 5	† 40*a*$1.00	9 *a*14¾	9 *a*14
July...	9¾*a*12	4 *a* 7	† 65*a*$1.25	11¾*a*14	12 *a*15
Aug....	11 *a*16½	5¾*a*10	† 87*a*$1.25	13 *a*19	13 *a*19¼
Sept...	11¾*a*14	5¾*a* 9	† 61*a*$1.25	14¾*a*18	15 *a*18¾
Oct....	12 *a*21	7¾*a*18	† 75*a*$1.75	15 *a*25	17 *a*26
Nov...	*18 *a*45	*14 *a*35	†$1.00*a*$3.75	*21 *a*55	*25 *a*55
Dec...	*22¾*a*50	*17 *a*45	†$1.50*a*$5.00	*25 *a*50	*30 *a*52¼

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THE

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PUBLISHED ON 1ST AND 15TH OF EVERY MONTH.

C. ELTON BUCK, ... EDITOR.

WEDNESDAY, APRIL 15, 1863.

The bill to compel gas companies to charge uniform prices for gas served to their consumers has not yet received the sanction of the Legislature. Other measures of some importance have claimed the attention of that august body, and the gas bill has been, for the time, allowed to drop. Meanwhile, we learn that the opponents of the bill have not abated one jot of their exertions to defeat it; and as these opponents have had much experience in Legislative action, and understand the most forcible kind of arguments to use at Albany, the prospects of the ultimate passage of the bill are not so favorable as we had reason to believe they would be. Not only do the old Brooklyn Company oppose its passage with unwonted energy, but other companies, exhibiting a clannish spirit of intolerance against opposition companies, have ranged themselves on the side of the regulars, and are contending that the bill must be defeated. The people of Brooklyn, who are really the parties most interested in this matter, must see to it that their cause is prosecuted before the Legislature with all energy, and that sound arguments be presented to meet the sophistry which will be brought to bear in favor of the opponents of the bill.

With the exception of this family quarrel between the two gas-light companies of Brooklyn—and this is by no means a new affair—nothing of any moment in relation to gas matters has occurred. We hear of no new complications—no new processes being adopted, and no new discoveries being made. We may perhaps except from the statement that no new processes are being tried, the fact that the gas-works of Scranton, Pa., are now being altered to use GWYNNE'S patent water-gas process, which we understand is to be tried at that town in a most thorough and effectual manner. Scranton being a place of some fifteen thousand inhabitants, and being withal compactly built, with handsome stores and dwellings, presents more the appearance of a city than a town of its population. The gas-works are large, and were built on a scale commensurate with the importance of the place; and all the appliances will be at hand to render the experiments with this water-gas as perfect as possible. In all the well known experiments with water-gas, as for example, Dr. FRANKLAND'S and Dr. FYFE'S, which differed so materially in their results, the apparatus was entirely too small to give reliable results. It will be remembered that these two chemists differed very widely in their deductions—Dr. FRANKLAND deeming water-gas to be a great improvement, while Dr. FYFE condemned it *in toto*. But all gas-engineers know the uncertainty which attends experiments of this kind when conducted on too small a scale. At Scranton, the works are of a sufficient size to determine the question one way or the other, and we hope soon to have the vexed matter settled.

We hear very little now-a-days of petroleum gas. There seems to have gone abroad among engineers, a very general conviction that gas made from petroleum can never compete with coal-gas. In some places we have known of wood and petroleum being used together with good results. The poorer gases resulting from the carbonization of wood form a very suitable diluent for the richer hydro-carbon gases and vapors from petroleum, and when submitted to a large extent of reheating surface, they appear to readily combine and form permanent gases. The chemistry of this union is not yet clearly defined, although many attempts have been made to explain the rationale of the operation. Where crude petroleum alone is used for carbonizing, the naphtha and other very volatile hydro-carbons, which constitute a large portion all crude petroleum, give rise to much trouble and annoyance; and in fact render the crude oil totally unfit for use. These light compounds fly off in a state of vapor the moment they enter the heated retorts, and thence they pass into the hydraulic main and along into the holder and pipes. Although these hydro-carbons are easily condensed—and it is their liability to condense in the pipes and fittings, which is the chief evil they accomplish—yet merely cooling the gas does not suffice to cause them to deposit. Time is required also. This is proved by the fact, that even after a most thorough condensation and washing, petroleum gas will, after a time, deposit liquid matter in the pipes, and this is frequently a great source of trouble, often clogging them up and stopping the flow of the gas entirely—at other times, dropping from the fixtures, and emitting a smell of naphtha not at all agreeable.

But while the light crude petroleums are not adapted for making gas, there are heavy oils and tar which result from their distillation, and which are in some localities profitably used. These substances approximate more nearly to rosin than any other materials, and in many instances they have been adopted since the scarcity of rosin was first felt. They are well adapted for making gas for large buildings, hotels, theatres, and the like, which may be produced from them at a moderate outlay and with very little trouble. For all large gas-works, however, coal will still be the main reliance of the engineer, and it will probably be many years, if ever, before a substitute will be found, possessing its many valuable qualities.

SEWERAGE OF CITIES.

In another column will be found a timely article on the sewerage of New York city, which we copy from the *Evening Post*, and which should demand something more than a passing remark from thoughtful readers.

The importance of a thorough and effective system of sewerage in a large city is too patent to the minds of intelligent observers to need a word of argument in its support. But although a mental assent may be given to this proposition, in too many instances, the spirit of inactivity and procrastination which characterizes the actions of the authorities amounts almost to a virtual denial of its truth; and so far as any practical results ensue, a contradiction of the proposition would be quite as productive of good as if it were allowed and yet not acted on. Such, it seems to us, has been the way in which the sewerage question has been treated in this city, and such, we fear, will continue to be its fate until its absolute importance is forced upon the public by the occurrence of some calamitous epidemic, fearfully emphasizing the argument, of those, who, like the writer in the *Post*, have for years unavailingly clamored for reform.

This question of providing a better system of sewerage than that now in operation in this city has occupied the attention of men of science for years, and it has been the theme of many an article in the daily papers. And yet no action has been taken. New York, which, from its admirable position, should be one of the cleanest and most thoroughly sewered cities in the world, is sadly behind many other and less important places in this respect. The consequence of this is seen in the disproportionately large weekly bills of mortality. The crowded tenement-house system has, doubtless, much to do with this; but the filthy condition of the streets, the garbage and offal allowed to remain for days and weeks together in some of the more obscure thoroughfares, and the limited sewerage capacity—all assist in swelling the mortality, which is much larger than it should be in a city of the population of New York. In the article we take from the *Post*, the HACKLEY contract for cleaning the streets is justly alluded to in proper terms—it being one of the most nefarious swindles ever perpetrated upon a community. In very few other places could such a fraud be practiced with impunity. We commend the article we have alluded to to every one interested in the prosperity of this Metropolis of the New World, as the subject is of vital importance, and should receive immediate attention.

ILLUMINATING POWER OF GAS.

In our article on page 298 of our last issue, while comparing the illuminating power of New York gas with that furnished by the three London companies, upon whose operations Dr. LETHEBY'S report was made, we omitted to mention the fact, that in the city of Brooklyn the quality of the gas is even better than that distributed here. The Citizens' Gas-Light Company, with a characteristic desire to accommodate their consumers to the fullest extent, have, among other things, been making for months past, gas of 19-candle power. The contrast afforded by their statement with that of Dr. LETHEBY, regarding the London companies above alluded to, is very wide, and goes to confirm the impression we have frequently expressed that the gas-engineers of America furnish, on an average, much better gas than that manufactured and distributed in England. If any of our English friends think differently, we will cheerfully publish any figures they may furnish to assist their side of the case.

MESSRS. HARRIS & Co.—The advertisement of these well-known Philadelphia gas-meter manufacturers is on the outside page, and deserves the careful attention of gas-light companies. The Messrs. HARRIS' success is the best evidence of the merit of their meters. The one speaks for the other.

GAS-LIGHT HEAD-DRESSES.—The description of these unique and brilliant *ornéments de tête* which was published in No. 74 of the AMERICAN GAS-LIGHT JOURNAL, Jan. 15, 1863, has been copied and re-copied throughout this country, north and south, and in, perhaps, every part of Europe. The *Express* of this city first copied it, and, naturally enough, without giving anyone credit; the *Home Journal* followed, honorably according the proper paternity; the *Evening Post* then took it, and soon it appeared in the papers of Philadelphia, Boston, Baltimore, then jumped across the lines and turned up in the Southern Confederacy, where, alas! there is no gas and no gold to adorn the belles of the sunny south.

Next we hear of it in the English papers, secular and scientific, the *Chemical News* getting the authorship of it, by-the-by; then it crossed the Channel, and the last we heard of it the Emperor was studying it out in his official organ, intending, no doubt, to set the Tuilleries in a blaze on the occasion of his next *bal travesti*.

SEWERAGE OF NEW YORK CITY.

It is apparent that at no distant day the entire system of our city sewerage must undergo a thorough reconstruction. Built by separate contracts and not with reference to a common drainage, there are portions of it which do not correspond with each other, and which even clog each other. We are credibly informed that in some cases where the contractors encountered rock, instead of blasting through to continue the regular descent, they built over it, making a reservoir for the deposit of rubbish and stagnant water. That these or other obstructions exist is proved by the cessation of flow at the curbs during heavy rains. It is true that the sewers are taxed with a service never contemplated by the city or by the builders, viz.: To carry off the street dirt, as well as the surface water. But they are nevertheless too small even for the latter. They were begun when the requirement for this was much below what it is now, and the scale has never been altered, or if so, very inadequately.

Nature made the island of New York expressly for the site of a great city. There was a crown or back bone along the middle of it, from which the descent to tide-water on either side was gradual and perfectly adapted for drainage. But the contractors have spoiled it. It was considered of more importance to get votes through jobs, than to preserve the excellent sanitary advantages of the surface; and the double purpose was answered of electing corrupt city officers and destroying the conditions of public health. This has been going on for a generation, and the grade of the surface is now reduced so near to a dead level, that sewers cannot be built from the middle of the island to the rivers with descent enough to get a free flow of water. As a consequence, we are now forced upon the necessity of restoring what we have formerly destroyed. The elevation of the central grades is the only method by which we can secure effectual sewerage. And this must be done if we expect to save our great city from destructive epidemics and plagues. The effect of the present condition of our streets upon the sewerage is even now most threatening to the public health. The Hackley-Hope contract is the worst and most hopeless of all the bad jobs ever fastened upon the city. Every heavy rain washes hundreds of tons of street dirt into the sewers, and it is deposited at their mouths, especially along the Hudson River, whence at low tide it is laid bare in the sun, to spread its noxious exhalations over the city. For miles in extent, reaching nearly to the middle of the island, it is now a frequent necessity for citizens to close every crack of door or window, and even then they do not succeed in excluding from their houses the intolerable stench that loads the air. This stench has at times been charged upon the Manhattan Gas Works, but though these contribute their share, the main cause is the deposit of filth from the sewer mouths. It is swept up and down by the tides, and collects in immense beds between the jutting piers. Whether this is designed as a cheap way of making new land by the owners of the water-right, we only suggest as not beyond the ingenuity of "parties interested." On the East River side, and around the battery, the fraud of the Hackley-Hope contract is illustrated by dredging boats, without which the docks would soon become as bad as those higher up on the Hudson. To this subject we respectfully call the attention of the Harbor Commissioners.

The cost of reconstructing the sewers of New York will be less the sooner it is begun. We believe it cannot be avoided. The old lines of excavation will answer as far as they go, needing only enlargement; and perhaps much of the tributary work of the smaller streets may be preserved. At all events, any futher building of sewers on the existing scale ought to be prevented, and a bureau of engineers constituted to take charge of the subject with a view to a permanent, effective, and economical system for the whole island.—*Evening Post.*

New Subway in London.—A new subway for gas and water mains is talked of in London, and we would not be surprised if ere long nearly every prominent street in that city would be tunnelled by a subterranean receptacle for the numerous mains which underlie all the thoroughfares. They would certainly save much annoyance and expense, by avoiding the necessity of so frequently breaking up the streets, as is now indispensable whenever water or gas is introduced into a house.

New Hydraulic Engine—Steam Superseded.—At the office of the Water-works in Wolverhampton in England, a hydraulic engine is doing the work of a steam-engine in the most complete and satisfactory manner. At least, so says the Wolverhampton *Chronicle*. It is the invention of Mr. Henry James Lewis, a practical engineer. Its mechanism in appearance is much the same as that of the steam-engine, with the exception that it has two globes or air vessels upon the cylinder. The action is very simple. The water is supplied to the engine from the main by means of an ordinary pipe, and can be turned on or off by means of a common stop-cock at pleasure. When the engine is about to be set to work, the water is allowed to pass into a chest or nozzle, within which is a slide-valve, the same as is used in a steam-engine. The water, having filled the nozzle, rushes through the passage that is not covered by the slide-valve into the cylinder, forcing the piston along with it, at the same time compressing the air in one of the globes or air-vessels until the slide-valve shuts the passage; when the air that is now compressed in the one globe, by giving a certain amount of elasticity to the water acting on the piston, enables the crank to continue its motion. After the valve has covered the one passage, preparatory to opening the other passage for the return stroke of the engine, the same process is repeated. The rectilinear motion is converted into a rotary motion by means of a connecting rod and crank, and applied to the purpose for which it is required by ordinary pulley bands.

Colliery Explosion in England.—An explosion of fire damp recently took place at the Coxlodge Colliery, near Newcastle-upon-Tyne, England, by which fifteen lives or more were lost. It is believed that a fall of coal freed a volume of explosive gas, to which the lights, which were uncovered, set fire; but most, if not all, of the deaths appear to have been caused by the "after-damp" generated by the explosion, the work-people having taken the most dangerous course out because it was the nearest. In the part where the explosion occurred, it is said the pit was supplied with 11,000 cubic feet of air per minute, and so pure and "clean," as the pitmen call it, was the pit believed to be, that the naked lights were uniformly used without any apprehension of danger.

Gas in Brazil.—Mr. Hunter Jones, late of Northampton, England, has been appointed acting engineer and manager of the gas-works at Bahia.

ANSWERS TO CORRESPONDENTS.

E. P. C., of Mass.—*The first gas-meter was constructed in* 1815 *by Mr. Clegg. Previous to that time gas was sold at an annual rent, at so much per burner. Mr. Clegg adopted several expedients to register the gas, and finally hit upon the revolving drum, as is now used in the ordinary wet gas-meter. This was patented about the year* 1816. *Mr. Malam patented the first dry meter in* 1820.

C. P. F., of Ill.—*We cannot inform you of the results, as we were not apprised of them. Write directly to the office.*

S. B. F., of Ky.—*The works are doing very well and furnish a good light to consumers. The process is said to work satisfactorily.*

A. P. I., of Me.—*Your favor was received in due time. We will attend to it and reply by mail.*

L. E. D., of Pa.—*The coal you inquire about has but a small amount of volatile matter—too little in fact to permit its use in making gas with any profit. It has also a large quantity of sulphur.*

E. J. O., of N. Y.—*The report was received. The back numbers were sent by mail.*

CORRESPONDENCE.

CONICALLY SLOTTED SOLID WOOD TRAYS FOR GAS PURIFIERS.

To the Editor of the American Gas-Light Journal:

In a letter of R. G. Hunt, published in your Journal on the 2d of March last, there is a stupid attempt to prove a difference between the Commissioner of Patents and my legal opinion, given to a client for his information. The garbled letter of the Commissioner merely says, that a certain paper does not contain an invention named—nothing more.

The facts are few and simple. 1st. Hunt applied for a patent in 1860, for the conically slotted trays or sieves, which was assigned to Mr. J. L. Cheesman, and R. R. Hunt, the applicant's son. The Office refused the patent, and in 1861 the application was withdrawn. Subsequently, Mr. Combe, the real inventor, applied for a patent for the invention, and Hunt, hearing of this, again put in an application for the invention, which was declared to interfere with Combe's. An interference was declared, and evidence taken by both parties, and the invention proved to be Combe's and not Hunt's, after an appeal by Hunt, first to the Board of Appeal, next to the Commissioner of Patents, and lastly to the Judge of the Circuit Court, District of Columbia, all of whom decided against Hunt and in favor of Combe, but on a little point, namely—the shape of the slot at the ends, on which there was no claim made by Combe. Hunt obtained a claim—but that claim gives neither him, or his assignees, the right to use the original invention. But, whatever of invention has been secured to Hunt belongs to his assignees, Cheesman and R. R. Hunt, the invention being the same as that assigned to them, as fully appears by the following extract of a letter written by his attorney to the Commissioner of Patents while the interference was pending:

"New York, 7th *June*, 1861.

"Hon. D. P. Holloway, Commr. Patents:

"Sir,—In reply to your official letter, I would say that if the examiner will do me the favor to refer to a prior application of R. G. Hunt, withdrawn, filed 1860, withdrawn 1861, for the *same seive*, for which the patent in question was granted, and the model thereof, he will observe that the Cheesman referred to in the official letter, was one of the assignees of Hunt, the applicant, and as such assignee signed the withdrawal paper. * * * He was then acting under title from Hunt. * * * *

"Yours truly,

"F. C. Treadwell, Jr.,

"Atty. for R. G. Hunt."

By the above quoted letter, it will be seen that Hunt and his attorney *knew* that the rejected application was for the *same seive* as that since patented. With this, I leave the subterfuge over R. G. Hunt's signature.

J. J. Greenough,
Counsellor-at-Law,
No. 6 Wall street.

EXPERIMENTS WITH GAS-BURNERS.

Office Louisville Gas Co.,
Louisville, Ky., April 2d, 1863.

To the Editor of the American Gas-Light Journal:

I have recently made a series of experiments with gas burners, comparing their flame, under pressures gradually increased, with the light of sperm candles; enclosed you have the result in tabular form. The result of the trial of each burner at each pressure is the average reading of the photometer bar, made during intervals of from five to ten minutes duration. Before and after each trial the candle was weighed, and the quantity of grains of candle consumed during the interval noted. The photometer bar was 125 inches long, and the candle fixed at one and the gas-burner at the other extremity; the room colored a dead black; the Bunsen photometer had attached to the conical screen a wire frame covered with black velvet, so as effectually to exclude from the eyes of the operator the light from either end of the photometer bar. The batswing burner is not a favorite burner with me; in frequent trials with iron batswings the flame was found to be thin, and rarely, if ever, equal in illuminating power to a fishtail burner, consuming the same quantity of gas; the Steatite or Lava batswings used in these experiments were found to give a thicker flame than the iron batswings; the light of the large-sized Steatite batswings was found to be fully equal to that from the same sized fishtail, and the light from the smaller Steatite batswings not much inferior to that from a fishtail of the same capacity. The batswing-burners, at low pressures, give an unsteady light, and will not, at any pressure, give so handsome a flame as the fishtail burners, and notwithstanding the high illuminating power obtained from the Steatite batswings, the Steatite fishtail burners are undoubtedly the best burner for general use.

Yours very truly,

Robt. G. Courtenay.

EXPERIMENTS WITH GAS-BURNERS

Compared with Judd's Sperm Candles—6 to the pound—reduced to a consumption of 120 grains per hour.

DESCRIPTION OF GAS-BURNER.	Pressure at burner in tenths of inches of water.	Consumption of Gas per hour, in cubic feet.	Yields light equal to candles, burning 120 grains per hour.	One foot of Gas per hour equal to Candles.	One foot of Gas per hour equal grains of Candle.	Consumption of Judd's Sperm Candle used in trials, in grains, per hour.
No. 1. Steatite Fishtail, marked 8 feet, A, March 18th, 1863. Temperature, 66°F.	0.2	2.91	11.420	3.924	470.92	125
	0.3	3.74	15.606	4.172	500.73	120
	0.4	4.34	20.631	4.753	570.44	138
	0.5	4.98	21.833	4.384	526.08	135
	0.6	5.46	23.745	4.349	521.88	130
	0.7	6.04	26.370	4.366	523.90	120
	0.8	6.60	29.286	4.437	532 47	120
	0.9	7.10	30.270	4.263	511.61	126
	1.0	7.44	31.673	4.257	510.86	122
	1.1	7.95	33.671	4.235	508.24	120
	1.2	8.47	33.671	3.725	477.04	120
No. 2. Steatite Fishtail, marked 7 feet, B, March 19th, 1863. Temperature, 54°.	0.2	2.94	12.368	4.201	504.14	114
	0.3	3.70	15.979	4.268	512.14	126
	0.4	4.40	18.937	4.340	516.48	130
	0.5	5.02	22.392	4.461	535 27	126
	0.6	5.60	23.995	4.284	514.17	126
	0.7	6.04	27.368	4.531	543.73	132
	0.8	6.42	28.480	4.436	532.34	120
	0.9	6.86	30.018	4.375	525.09	123
	1.0	7.32	32.111	4.386	526.41	120
	1.1	7.65	34.282	4.381	524.69	125
No. 3. Steatite Fishtail, marked 6 feet, D, March 20th, 1863. Temperature, 52°.	0.2	2.44	10.460	4.287	514.5	138
	0.3	3.14	12.425	3.957	474.87	126
	0.4	3.74	15.698	4.197	503.7	138
	0.5	4.20	18.111	4.459	535.06	144
	0.6	4.74	19.481	4.108	492.98	132
	0.7	5.12	23.174	4.526	543 14	120
	0.8	5.48	24.204	4.416	530.01	138
	0.9	5.96	24.111	4.045	485.45	132
	1.0	6.30	25.029	3.973	476.74	126
No. 4. Steatite Fishtail, marked 5 feet, D, March 21st, 1863. Temperature, 63°.	0.3	2.40	7.934	3.306	396.70	120
	0.4	2.866	11.104	3.841	464.93	130
	0.5	3.24	12.601	3.889	466.70	120
	0.6	3.62	15.039	4.152	498.25	120
	0.7	4.02	16.955	4.217	506.13	132
	0.8	4.30	17.710	4.118	494.24	120
	0.9	4.64	17.381	3.746	449.51	132
	1.0	4.96	17.445	3.517	422.07	126
No. 5. Steatite Fishtail, marked 5 feet, A, March 24th, 1863. Temperature, 62°.	0.3	2.43	8.890	3.559	439.09	125
	0.4	2.84	9.558	3.366	403.59	126
	0.5	3.26	10.181	3.316	397.92	102
	0.6	3.60	15.414	4.295	513.80	120
	0.7	3.96	15.161	3.792	455.03	132
	0.8	4.22	14.671	3.476	417.21	102
	0.9	4 60	16.217	3.525	423.07	131
	1.0	4.86	18.181	3.735	448.86	108
	1.1	5.15	16.581	3.219	386.36	127.5
No. 6. Steatite Fishtail, marked 4 feet, D, March 27th, 1863. Temperature, 60°.	0.3	1.89	6.678	3.508	421.23	120
	0.4	2.32	8.402	3.765	451.82	114
	0.5	2.62	9.654	3 685	442.20	126
	0.6	2.96	10.628	3.591	430.88	130
	0.7	3.28	11.464	3.495	419.41	120
	0.8	3.52	12.465	3.541	424.96	129
	0.6	3.775	12.954	3.431	411.73	112.5
	1.0	3.96	14.856	3.939	472.68	126
No. 7. Steatite Fishtail, marked 3 feet, A, March 26th, 1863. Temperature, 50°. Burner blew at 8-10 pressure.	0.3	1.82	5.171	2.840	340.87	130
	0.4	2.23	6.123	2.746	329.54	125
	0.5	2.62	7.086	2.832	339.81	132
	0.6	2.82	8.755	3.104	372 55	138
	0.7	3.20	10.189	3.184	382.09	126
No. 8. Steatite Batswing, marked 8 feet, E, March 17th, 1863. Temperature, 70°.	0.2	2.60	10.456	4.021	482.57	135
	0.3	3.48	14.731	4.233	507.29	126
	0.4	4.28	21.348	4.987	598.51	132
	0.5	4.92	23.288	4.733	568.01	144
	0.6	5.62	26.557	4.725	567.06	132
	0.7	6.12	26.888	4.393	527.22	126
	9.8	6.74	30.647	4.547	545.64	120
	0.9	7 16	31.483	4.396	527.64	114
	1.0	7.60	32.111	4.225	507.01	120
	1.1	7.98	34.769	4.183	502.04	120
	1.2	8.76	35.911	4.094	491.33	120
No. 9. Steatite Batswing, marked 7 feet E, March 19th, 1863. Temperature, 54°.	0.2	1.62	5.644	3.484	418.09	138
	0.3	2.24	7.913	3.562	423 92	138
	0.4	2.88	11.401	3.959	475.06	132
	0.5	3.56	13.045	3.664	439.73	126
	0.6	4.04	15.948	3.947	473.69	132
	0.7	4.66	19.734	4.234	508.17	132
	0.8	5.08	20.398	4.015	481.85	126
	0.9	5.54	24.111	4.353	522.43	132
	1.0	6.00	22.024	3.670	440.49	138
	1.1	6.375	24.830	3.894	467.39	125
No. 10. Steatite Batswing, marked 6 feet, E, March 24th, 1863. Temperature, 62°.	0.3	2.06	5.988	2.907	348.84	132
	0.4	2 44	10.139	4.155	498.64	120
	0.5	3.34	13.488	4.038	481.61	138
	0.6	4.075	13.832	3.394	407.34	127.5
	0.7	4.64	15.599	3.347	401.69	126
	0.8	5.30	16.820	3.373	404.77	127.5
	0.9	5.78	23.661	4.093	491.25	126
	1.0	6.16	25.137	4 080	457.04	132
	1.2	6.60	26.503	4.015	481.87	126
No. 11. Steatite Batswing, marked 5 feet G, March 23rd, 1863. Temperature, 70°.	0.4	2.61	10.837	4.156	498.81	100
	0.5	3.08	12.747	4.138	496.62	126
	0.6	3.56	15.414	4.329	519.57	120
	0.7	3.92	17 166	4.379	525.50	132
	0.8	4.38	17.481	3.990	478.90	120
	0.9	4.72	19.637	4.150	498.02	126
	1.0	5.05	16.826	3.332	399.82	120
	1.1	5.40	18.656	3.450	414.58	120
No. 12. Steatite Batswing, marked 3 feet, G, March 30th, 1863. Temperature, 50°.	0.4	1.53	5.076	3.317	398.15	130
	0.5	1.88	5.826	3.099	371.90	126
	0.6	2.14	6.404	2.992	359.11	132
	0.7	2.50	6.893	2.757	330.86	138
	0.8	2.84	7.454	2.624	314.97	138
	0.9	3.14	7.913	2.520	302.40	126
	1.0	3.32	9.002	2.711	325.39	132
No. 13. Iron Batswing, Marked 4 feet, March 27th, 1863. Temperature, 61°.	0.4	1.67	4.365	2.614	313.71	139
	0.5	1.90	5.301	2.789	334.79	132
	0.6	2.24	6.221	2.777	330.30	132
	0.7	2.46	6.673	2.712	325.55	126
	0.8	2.78	7.310	2.629	315 54	120
	0.9	2.98	8.257	2.771	332.52	127.5
	1.0	3.30	7.709	2.336	280.30	124
	1.1	3.90	10.677	2.737	328.54	108
	1.2	4.02	10.250	2 549	305.97	120
No. 14. A small brass cylinder, drilled with 7 holes, for jets, arranged so that each flame from the jets touch, and form one flat flame.	0.1	2.286	5 456	2.386	286.31	128.5
No. 15. A similar cylinder, with 7 holes, drilled by the same drill, the holes placed further apart, so as to form seven separate jets of flame. NOTE.—The seven jets which touched and formed one flat flame, gave 49 per cent. more light, for the same quantity of gas, than when burned in the separate jets.	0.1	2.057	3.276	1.593	191.17	117

ILLUMINATING POWER OF LONDON GAS.—Dr. Hillier in his report on the quality of gas manufactured by the Imperial Gas Company of London, during the month of January, states that the highest result obtained was 15 candles, and the lowest 12.6 candles. The average of all his results was 13.8 candles. This is doing pretty well for London, but it is by no means up to the New York or Brooklyn or Philadelphia standard. The chemical quality of the Imperial gas was good; there being traces only of ammonia, and no sulphurretted hydrogen.

GAS EXPLOSION IN ENGLAND—An explosion of gas recently took place in the buildings of the Magnetic Telegraph Company, No. 58 Threadneedle street, London. It appears that the housekeeper had lighted one of the gas-burners in a back room on the second floor, for the purpose of seeing to clean the room; and shortly afterwards, the gas must have escaped from some of the other burners, probably by not being turned off; for suddenly the gas ignited, and exploded with great violence, blowing out the windows of three or four offices, and setting the back-room on the second floor in flames. The various persons employed on the premises instantly rendered assistance, and by turning off the gas at the main, prevented any further escape. Mr. Foreman Bridges quickly attended with his engines; but the inmates had succeeded in getting the fire extinguished during the interval.

The damage done is thus officially returned to the insurance offices: "Back rooms on second floor, used as offices, and contents severely damaged by fire and explosion, ceilings under damaged by water, and a great quantity of windows broken."

PATENTS.

UNITED STATES.

37,945.—J. O. Blythe, Philadelphia, Pa., for a Lamp Burner:

I claim the peculiar construction of the burner, S, in combination with the collar, F F, and the tube plate, l l, as combined with it (the tube) and attached to the screw in the top o the lamp, as shown in the drawing, or in Fig. No. 4; this burner having no perforations in its sides or wire cloth, and rising above the collar, and having a narrow flange turned over at the top with a screw cut upon it, as substantially described and set forth.

37,956.—M. B. Dyott, Philadelphia, Pa., for a Lamp Cone:

I claim corrugating or swaging the sides of the cone or deflector so as to form prominences or indentations, by which the necessary supply of air is prevented from being intercepted or cut off, whether admitted through perforations in the base of the cone or through air-ducts formed by corrugations or prominences upon the base of the cone, substantially as and for the purpose above set forth.

37,959.—G. W. Fuller, Cambridgepost, Mass., for a Submarine Lantern:

I claim a lantern as made or provided with an air induction conduit, and with a valve opening and valve arranged with respect to the body of the said lantern and for the purpose of supplying air to the lamp thereof, and of discharging the smoke and spent products of combustion into the water, when the lantern may be submerged therein, as specified.

I also claim the combination for applying the glass window, b, to the body, A, of the lantern, and so as to enable such window not only to be closed with a water-tight joint, but to be opened on a hinge for the purpose, as described, the same consisting of the rings, c d, the hinge and the section of screws connected with or applied to the rings and the lantern case, substantially as specified.

I also claim the combination and arrangement of the air-ventilating devices, N O, and their screw stoppers or their mechanical equivalents, with the lantern body or case, the same being for the purpose set forth.

I also claim the arrangement or combination of the air inlet or inlets, q, with the lamp, and glass window, in manner so that the air forced into the lantern case may be, on its entrance therein, discharged either against the inner surface of the glass window, or upward between the same and the flame or chimney of the lamp, the same being for the purpose hereinbefore set forth.

I also claim the combination and arrangement of mechanism for raising the glass chimney and the conical deflector, in order that access may be had to the wick, the same consisting of the fraem, u, the forked lever, a', and the connecting bars, z z; the said frame, u, being provided with guides, as specified.

I also claim the arrangement of the mariner's compass, viz., within the lantern body and with respect to the lamp and the window of the said body or on the lever, a', as specified.

I also claim the combination and arrangement of the water-receiving and guard chamber, R, and chimney cap, or dome, Q, with the opening, P, and the valve seat, S, and valve, T, applied or arranged with respect to the lamp, and the lantern body, substantially as specified.

I also claim the combination of the check nut, W, with the handle, X, the cap, V, and the screws by which the latter is connected to the upper part of the lantern case.

37,981.—George Ross, Newport, Ky., for a Pattern for Molding Pipes:

I claim, first, The application to the pattern, A, of a movable sectional ring, B, or its equivalent capable of being pushed out and drawn in while the pattern is in the sand, in the manner and for the purpose substantially as specified.

Second, The arrangement of the rising and falling conical plunger, D, and springs, C, in combination with the studs, d, and sectional ring, B, constructed and operating substantially as and for the prupose shown and described.

37,983.—J. W. Schreiber, New York City, for a Coal-oil Lamp without a Chimney:

I claim the combination of the rounded top wick-tube, c, and the perforated jacket, b, when the latter is provided with a slot or opening, h, in its top having its central part narrower than at its ends, as herein set forth.

37,986.—Charles F. Spencer, Rochester N. Y., for a Coal-oil Lamp:

I claim connecting the deflector and chimney with the wick tube or cap, by means of the sliding shank, b, secured to the guide, G, or its equivalent, in such a manner that the shank is held firmly in place when lowered, but forms a joint when raised, so as to turn vertically the chimney, and deflector back; the whole arranged, combined and operating, substantially as herein set forth.

37,987.—Abner G. Tisdel & William Nash, Watertown, N. Y., for an Attachment for converting Burning-fluid Lamps, into Coal-oil Lamps:

We claim the two prongs, A A, provided at their upper parts with perforated cap-shade terminals and slotted at their lower parts to form arms, b, which are connected to a suitable clamp, all arranged as and for the purpose herein set forth.

38,001.—Peter Budenbach (assignor to E. R. Bennett), New York City, for a Coal-oil Lamp for Locomotives:

I claim, first, Attaching the button, I, to a sliding tube, G, which is fitted within the tube, E, all arranged as shown, to support the bottom in proper position and admit of the ready adjustment of the same as set forth.

Second, The perforated cylinder, B, attached to the lower end of the outer tube, A, of the lamp, when said cylinder is made to project below said tube and form an eqtension of the same, as and for the purpose set forth.

The bridge in the oil-chamber, K, formed of the curved top plate, c, and perforated sides, d d, and provided with a perforated cylinder, M, any one or all of the perforated parts being used as and for the purpose specified.

Fourth, The perforated partition plate, J, in the wick chamber, b', as and for the purpose set forth.

38,017.—Warren A. Simonds, Boston, Mass., and Seth Warner, East Hampton, Mass., assignor to Seth Warner, Oliver Warren, North Hampton, and Albert L. Fernald, Boston, Mass., for Treating Gas for Illumination:

We claim forcing the gas thus made through a mixture of alcohol and chloride of lime, thereby effecting such a change in said gas that it is not liable to refrigeration or condensation; and also so decarbonizing said gas as to prevent smoke while burning and prepare it for and kind of burner.

30,815.—Charles N. Tyler, Buffalo, N. Y., for a Composition for Burning Fluid:

I claim, first, The compound produced by the combination of the mineral or earthy oils, with fusel oil, in the manner and for the purpose substantially as herein set forth, said compound canstituting a new manufacture.

Second, I also claim the compound produced by the combination of naphtha with alcohol and fusil oil.

Third, I also claim the heavy liquid obtained by treating the combination of petroleum or kerosene and fusil oil with alcohol.

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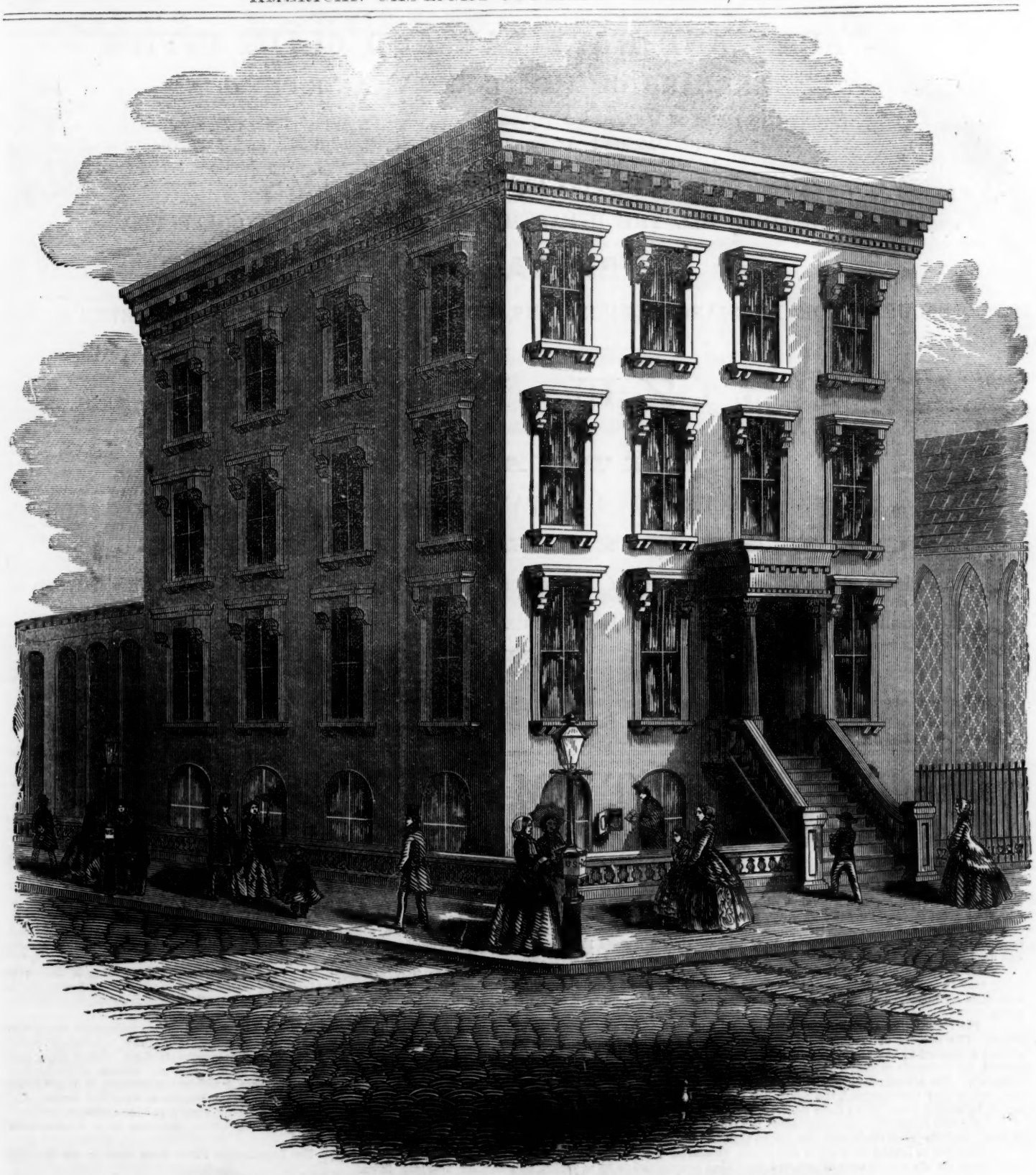

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Adopted by the UNITED STATES GOVERNMENT for the Principal Cities.

ALBERT POTTS, Philadelphia, Patentee.

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PATENT BITUMINIZED PIPES,

For the Conveyance of Water, Gas, and Drainage.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one-fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one-fourth* their price, without the possibility of the formation of the the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts.

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

The Patent Bituminized Pipes are neutral, non-conductors of electricity, and consequently are not exposed to any of the deteriorating influences mentioned above. The process of manufacture of these Pipes consists in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness; and thus, when hardened, a tube is formed of perfect texture, great hardness, and enormous strength. These Pipes are proved, by hydraulic pressure, to resist a pressure of 220 lbs. to the square inch, equal to 506 feet head of water, which is more than double the altitude of the highest reservoir. The bituminous composition which unites and covers these Pipes, is so well known as an excellent preservative, that it will be unnecessary to demonstrate that, when laid underground, the durability of the Patent Bituminized Pipes may be considered as unlimited. The Pipes are made in lengths of seven feet, and are connected by socket joints of the same material as the Pipes; or they can be fitted with iron flanged sockets, screwed together in a most simple and inexpensive manner.

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It is necessary to leave a small vent-hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air-bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stirring it as it cools until it becomes nearly as liquid as water; then pour quickly.

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POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP-POST LETTER-BOXES, which have been adopted by the Post-Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which, in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use there will be less likelihood of mistakes, and consequent collision, than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels consists in having the Lanterns containing the colored lights connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side-wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle-wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination. and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof. In pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle-wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the Lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships, so that such colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried. When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed. A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time. or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red,	Represents	Number	1.	Two Green,	Represents	Number	2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do.	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign ○ colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○,	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.
	○, ○.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○.	
○, ○, ○, ○, ○, ○, ○.	
	○, ○.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
○.	
○, ○, ○, ○, ○, ○, ○, ○, ○.	
	○, ○.
○, ○, ○, ○, ○, ○, ○, ○, ○.	

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

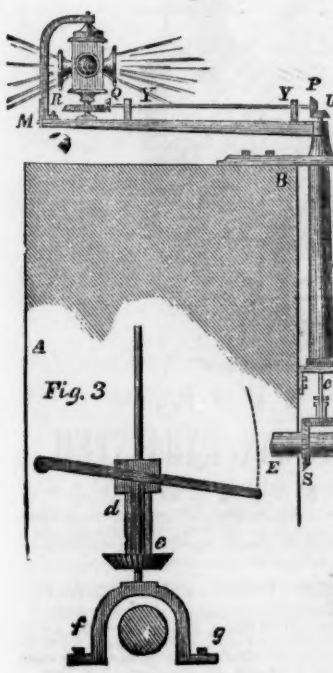
RED LIGHT.	GREEN LIGHT.
○, ○, ○, ○, ○.	
	○, ○, ○, ○, ○, ○.
	○.
○, ○, ○.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.)

Fig. 2



(GREEN LIGHT)

Fig. 1

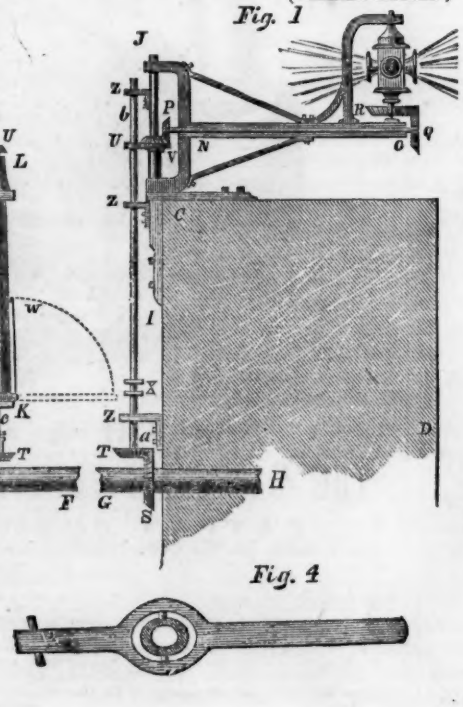


Fig. 3

Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs. 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

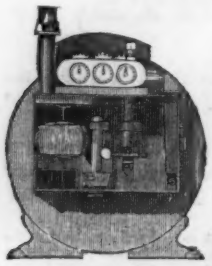
It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel house, but in this device, the rod c U. does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,

PHILADELPHIA, Pa.



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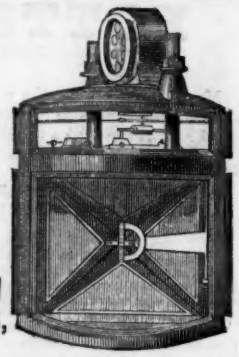

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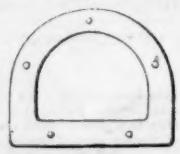

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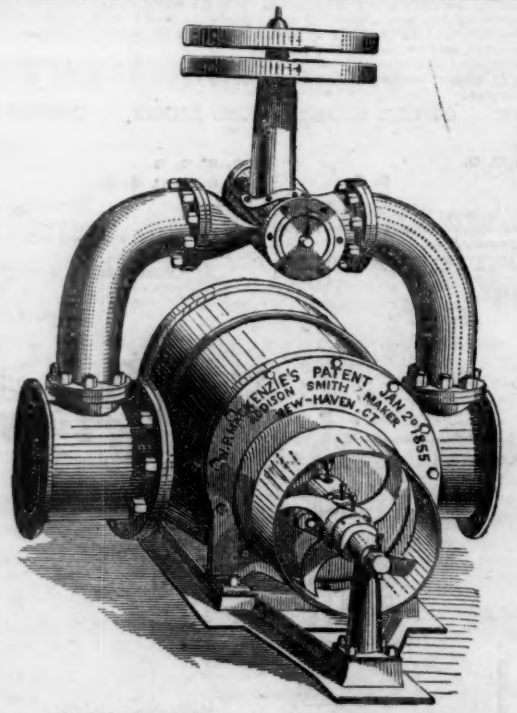

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